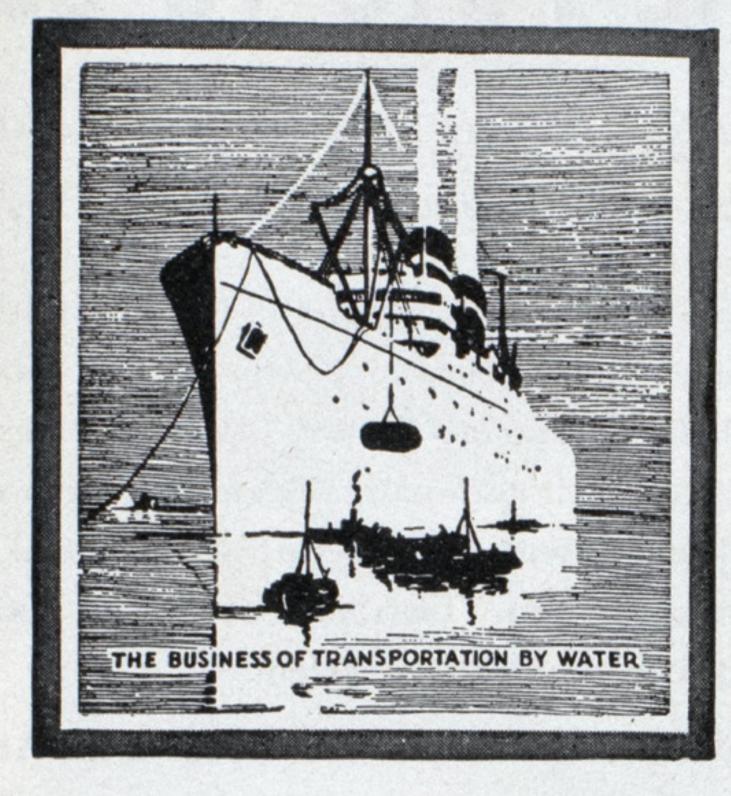
Marine Review

The National Publication Covering the Business of Transportation by Water

CLEVELAND

FOUNDED 1878

NEW YORK



Published monthly by The Penton Publishing Co. Cleveland, Ohio, U. S. A.

Cleveland Office, Penton Bldg.
A. H. Jansson, Editor
H. O. Taylor, Advertising Manager

Chicago Office, 1347 Peoples Gas Bldg. L. C. Pelott Fred B. Pletcher

New York Office, 220 Broadway,
Joseph Fuller, Eastern Manager
E. C. Kreutzberg
B. K. Price

Pittsburgh Office, 507-8 Oliver Bldg. S. H. Jasper W. G. Gude

San Francisco Office, 681 Market St. N. C. Nourse

Washington, D. C. Office, 1020 National Press Building L. M. Lamm

London Office, Caxton Ho Westminster, S. W. 1 Vincent Delport

CONTENTS

Vol. 61 December 1931 No. 12

	Page
Editorial	11
Naval Architects in Annual Meeting	12
Electrical Propulsion Developments	
Hoisting Vessel—H I for United States Army	22
Free Books for Men Who Go to Sea	29
Rudder Efficiency in Modern Design	24
By J. Livingston	•
Basle, Rhine Port, Traffic Increases	27
What the British Are Doing in Shipbuilding	28
Giant Gate Lifter—500-Ton Lift	29
Bauer Wach Turbine in Tanker Pan Bolivar	31
New Construction Ordered and Contemplated	32
Bunker Prices—Domestic and Foreign	32
Monarch of Bermuda About to Enter Service	38
Conte di Savoia, Fitted with Gyro Stabilizer	34
Higher Quality Steels Used in Shipbuilding	35
Maritime Law—Late Decisions	36
Ports-Marine Business Statistics Condensed	37
Stevedoring and Dock Management Progress Package Freight-Passenger Terminal at Rochester, By R. S. MacElwee	38
Useful Hints on Cargo Handling	41
Equipment Used Afloat and Ashore	
Personal Sketches of Marine Men E. R. Richardson, President Ocean S. S. Co.	
By Ben K. Price Up and Down the Great Lakes	46
Books—Late Marine Reviewed	

MARINE REVIEW is a member of the Audit Bureau of Circulations, Associated Business Papers Inc. and the National Publishers Association. Entered at the Post Office at Cleveland, Ohio, as Second Class Matter, under the act of March 3, 1879. Copyright 1931 by The Penton Publishing Co., Cleveland, O.



Subscription United States and its possessions, \$3 per year; Canada \$4.00; Great Britain and other Foreign Countries, £1:0:0. Single copies 35 cents. Back numbers over three months 50 cents. Cable addresses: Penton, Cleveland, and Irotrapen, London.

The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products.

« EDITORIAL »

Mail Pay for Higher Speeds Should Be Increased

Continuation and improvement of the transatlantic service begun by the United States lines may now confidently be expected. The strength in finance and in practical operating knowledge of the new group which has taken over this service will compare favorably with any shipowning and ship operating management anywhere. Chapman deserves great credit for his courageous attempt to keep the American flag in competition on the North Atlantic, but in these troublous times and under the terms of the contract by which he and his interests acquired the line, it was impossible to carry on successfully.

The new company headed by experienced shipping men and adequately backed financially not only possesses much greater strength, but it also receives the benefit of modification of the terms of the original purchase contract. On this new basis there is every assurance for success. The flag must be maintained on the North Atlantic. It must be made worth while for patriotic, honest, competent operators to ultimately furnish the traveling public with an American service equal to the best under foreign flags.

A number of factors enter into the success of the new venture. The obligations incurred for the existing ships are, if anything, less than the current sales price of the vessels in the world market. Efficiency and skill in every department of operation should henceforth be the rule in the management of the line. The facilities and experience of old established shipping companies can now be applied with the greatest energy to securing patronage, both freight and passengers. The United States government, recognizing the commercial necessity of being adequately represented in this trade, should so change the terms of the merchant marine act of 1928, that proportionately as equitable a mail contract be entered into with this line, considering the needs of the service in the way of modern, fast and costly ships, as is now the case with the many American lines to whom mail contracts have been awarded.

No merchant marine law ever passed has been of such definite help in keeping American ships on the trade routes of the world, but in arranging the rates of mail compensation for the higher speed ships, our lack of experience led to the fixing of a rate in proportion to increase of speed which bears no true relation to the tremendously increased cost. For every increase of a knot in speed for the greyhounds of the Atlantic a fair rate of increase in mail compensation per mile can be determined. The coming congress should amend the law accordingly. All fair minded men will allow that this is not proposed for private sel. fish ends. It is a measure needed by the nation if we are to launch and keep in operation a really first class successful transatlantic service under the American flag.

If it would seem to anyone that those who now manage and control this service would directly benefit by such action on the part of congress, the logical answer might be that the experiment of operating this line has been thoroughly exhausted, first under direct government control and then under private control. The results show that it is impossible to expect any human agency to overcome the disparities in competition with foreign lines. These disparities do not include, or only slightly so, any greater skill of management and personnel on the part of the foreigner. They are mainly founded on the difference in the standard of living. The American standard of living cannot be maintained on the wages paid by foreign lines to their personnel ashore and afloat.

Therefore, if we are to compete successfully, and the merchant marine act of 1928 is the deliberate mandate of congress that we shall do so protecting our American standards, then it merely becomes a question of adjusting and correcting an article of the law to a fair and equitable basis as a return for service rendered by ships of the costly transatlantic liner class.

Naval Architects in Annual Meeting

Shipbuilding Has Shown Marked Activity on East Coast—Future Must Depend on Replacements—Need Modern Efficient Ships for Merchant Marine

HE thirty-ninth annual meeting of the Society of Naval Architects and Marine Engineers was held in New York on Nov. 19 and 20, with J. Howland Gardner, president of the society, presiding. The growing strength of the society was indicated by the large attendance and the great interest taken in the presentation of the technical papers. Particularly enthusiastic was the reception accorded the monumental paper "Design of American Super Liners," by Theodore E. Ferris, one of America's foremost naval architects. The author was widely applauded for so unselfishly presenting to the society and to the industry as a whole the valuable results of the work done under his supervision on the design of super liners. As one commentator said, "Whenever the super liners are built and from whatever plans, much of the basic design will rest on the information developed by Mr. Ferris and his staff."

Important Committee Appointed

One of the important steps taken at this meeting was the appointment of a committee to conduct an engineering investigation of every phase of shipping and shipbuilding. The first duty of this committee will be to determine the minimum cost of building ships in this country as a basis of comparison with construction in foreign shipyards; also, the tonnage needs of the ship operators necessary to maintain an active and efficient fleet, second to none in the world, will be estimated. Differentials in the cost of construction and operation between this country and foreign nations will be studied, and from the data collected definite recommendations for equalizing these costs will be made.

One of the primary functions of the committee's work will be to co-ordinate all studies made by independent organizations on this important subject. To this end the personnel of the committee will be carefully selected to include outstanding engineers and business men from such bodies as the United States shipping board, the Merchant Fleet Corp., the American Steamship Owners' association, the National Council of American Shipbuilders, the American bureau of Shipping, the American Marine Standards committee and others.

The address by President J. Howland Gardner at the opening session of the thirty-ninth annual meeting, Nov. 19, held at the Engineering Societies building, 29 West Thirty-ninth street, New York city, follows practically in full: Address of J. Howland Gardner Gentlemen:

T GIVES me great pleasure to welcome you all to this, the thirty-ninth annual meeting of the Society of Naval Architects and Marine Engineers.

I fully realize the honor that has come to me as president of this society. At the same time I am mindful of the great responsibility, but with your help and loyal support we will, I am sure, carry forward the work that has been so ably started by your former president, Homer Ferguson, and those who have preceded him.

You have, I am sure, listened with interest to the report of the secretary-treasurer, and must be gratified to realize the sound financial position that our society holds, and the very satisfying increase in membership.

In spite of the general business depression, shipbuilding in the United States has up to now shown marked activity. This has been due almost entirely to the provisions of the merchant marine act of 1928.

During the fiscal year ending July 1, 1931, contracts have been placed for 16 ocean-going commercial vessels of approximately 122,000 gross tons. During this same time, 19 vessels of 166,000 gross tons have been delivered. On Sept. 1, 1930, there was under construction a total of 384,000 gross tons of ocean going and Great Lakes vessels. There is not included in this amount any vessels of less than 500 gross tons. Including miscellaneous vessels, barges and the like, there was building approximately 460,000 gross tons.

Shipbuilding for West Coast

Unfortunately, the great majority of this construction has been confined to East coast yards. The West coast yards, where there are ample facilities for building, have not shared in the production of this tonnage. It is hoped that some practical method may be found to minimize if not entirely to equalize the slight differential that our East coast yards enjoy due to their proximity to the raw material. We cannot afford to let our West coast yards lapse, for they are an essential part of this important industry and should be fostered in every way possible to the end that they may enjoy, and the country may have the benefit to be derived from shipbuilding on the Pacific. We have at times paid very dear for our lack of shipbuilding facilities, a lesson that it is hoped will not be forgotten. There

is unfortunately an almost total lack of building for the carriers on the Great Lakes. It is expected that this condition will improve with the general increase in business.

Unfortunately the immediate future for shipbuilding in this country is not bright. Only two contracts for oceangoing vessels are now in sight. There are building for the United States navy in navy yards 4 light cruisers, 2 submarines, 3 destroyers and 8 miscellaneous vessels, and in private yards, 1 aircraft carrier, 3 light cruisers, 1 submarine and 2 destroyers, and while there has been a general uniform level of employment by private shipyards during the latter part of 1929, 1930, and the early part of 1931, there is now a general reduction. It is anticipated that this reduction will amount to 25 per cent by next July, and by a year from next January the reduction will be over 68 per cent, a most serious situation to contemplate, and one in which we are vitally interested. This may be changed, and we hope will be corrected by improved business conditions.

New Cargo Ships Needed

Outside of a few tankers there has been practically no building of new cargo ships since 1922, and no general cargo-type vessels are under construction. We are far behind the principal maritime nations in the construction of modern tonnage. Of the total sea-going tonnage of Germany 50.2 per cent is in vessels less than 10 years old; the fleets of Great Britain and Ireland are 44.6 per cent; France 33.2 per cent, and for the United States only 9.3 per cent of the fleet is modern—or less than ten years old. The rapidly obsolescing tonnage in this country totals 9,392,371 gross tons. During the last ten years 52 per cent of our seagoing tonnage has been removed, due principally to the scrapping of war-built vessels. This removal has been at a much more rapid rate than that of any other power, the average for the principal maritime nations being but 24 per cent. During this same time the total world merchant tonnage has increased 12 per cent while that of the United States has decreased by 25 per cent.

It is beyond the realm of possibility that during the current depression a definite replacement program will be undertaken. An opportunity, however, exists for the development of a constructive program looking to the security of our merchant marine in the future. Since trade follows the

flag, we must secure that flag's position on the trade routes of the world. This cannot be accomplished with a dying fleet, but with a virile, evergrowing merchant marine that in modernity and efficiency can uphold its position in competition with the best the foreigner can produce. The work of providing such a fleet properly comes within the scope of members of this society, including as it does the shipbuilder and shipowner.

It is certain that action in this direction must be inaugurated and that without delay. As understood, the problem of providing the future merchant marine resolves itself into a continued activity in the improvement of our passenger tonnage and in providing cargo ships and ships for special service. In the mail contract and loan provisions of the merchant marine act of 1928, the machinery exists for assuring this country a passenger fleet. With some slight modifications in amplifying the mail rates, there need be little concern as to the replacement of obsolete passenger vessels. When needed additional new ships will be built. But in the class of cargo vessels the same conditions do not exist. It is here the society can undertake the initiative and prepare definite suggestions for the guidance of those whose function it will be to instigate the program.

Action by Society Proposed

The steps leading up to such action must be the determination of the tonnage needs of the shipowners; the minimum cost at which the shipbuilders can construct this tonnage; the basis upon which the shipowner can proceed with new ships; and finally how the differential in construction and operation costs can be met.

The advancement in the art of ship and engine design has been so rapid in the last few years that the cargo vessels we now have are practically obsolete. Improvements in underwater ship lines with the corresponding decrease in resistance coupled with greater efficiency in propelling machinery have placed the modern cargo ship far ahead of our old war-time vessels. We are fast reaching a point where we can no longer afford to run these ships in competition with those of more modern design embodying higher speeds and less operating costs.

With the exception of the 15 inland states every state in the union maintains active shipyards on the seacoast or on our Great Lakes or rivers, these states comprising 57 per cent of the area of our country and 88 per cent of our total population. In addition to this there is no industry like shipbuilding that touches more intimately the industrial life of a country; and yet, I regret to say, few people outside of that industry realize this fact. Many feel that aid to shipping is something that is given to a special favored few. The public fails to realize the industries that are directly benefited by every ship that is built. A careful study of this problem has developed that 50 per cent or more of the cost of a ship is expended for materials and equipment purchased by the shipbuilder, and is widely distributed throughout our country to the mines, the rolling mills, the forest products, electrical machinery, plumbing and hardware, tools, linen, cotton and woolen goods, together with the thousand and one items that go to complete a finished ship.

Increase In Air Transportation

As evidence of the increasing importance of aircraft in the world-wide transportation network, we note that American-owned airplanes engaged in regular scheduled transportation of mail, express and passengers are flying this year at the rate of over 51,000,000 miles per annum, an increase of 40 per cent over last year. American air services are carrying passengers at the rate of 1,000,000 per year,



J. Howland Gardner

President Society Naval Architects and
Marine Engineers

or more than 100 per cent increase over last year.

This past year has witnessed the extension of airlines to all important parts of the Western Hemisphere and the speeding up of service by improved equipment and the reduction of weather and flying hazards. The navy dirigible AKRON, commissioned this year, is a likely forerunner of a longdistance, load carrying, commercial airliner. The Do-x, by its flight from Europe to South America to New York, has proved the feasibility of a huge flying boat, and the 40-passenger Sikorsky, just placed in South American service, has demonstrated that big amphibians are practical for passenger and mail carrying.

The development of the catapult for propelling airplanes from the deck of a vessel has been so satisfactory from a military standpoint that nearly all new ship designs of the United States

navy provide for airplanes as standard equipment. The establishment of a regular ship-to-shore service for mail and passengers is under consideration by various steamship companies, and the newest liners are being equipped with airplanes for this purpose. A few yacht owners have recently installed aircraft on their vessels and there is an increasing tendency to make provisions for an airplane in yacht specifications. This use of airplanes in conjunction with ships is a thoroughly modern development, which we should regard with interest and prepare to take advantage of to the fullest extent.

With the rapid advancement in the art of vessel and machinery design the question of safety of the vessel has always been of the utmost importance. This has been specially marked in the subdivision of vessels, and in the equipment for fire detection and control.

Our United States steamboat inspection service under the guidance of General Hoover is giving these matters very special attention.

It is to be regretted that the United States has not yet ratified the 1929 international convention on safety of life at sea. It is earnestly hoped that the congress will pass the necessary legislation to make these rules effective, as far as the United States is concerned.

On the members of this society, naval architects, marine engineers, and those who are responsible for the operation of our great ships there rests a tremendous responsibility. I cannot urge upon you too strongly the increased use of fire resisting material in the construction, and especially in the superstructure of vessels.

There has been a continued improvement in fire-fighting equipment and fire detecting devices. It is your responsibility to see that fire-resisting material is used wherever practical. I do not wish to be an alarmist, but I do think we should look ahead to even further improvements. We can, however, view with satisfaction the records of the past. Transportation by water is remarkably safe.

A careful study of statistics will demonstrate the safety of transportation by water as compared with other modes of transportation. The United States steamboat inspection records for the ten years 1918 to 1927 inclusive show that for passengers traveling on vessels there was a loss of only one life in 4,104,642. This is certainly a record of safe transportation, and I am sure that the next ten years will show even greater improvement, for our ships are now and will be better and safer than ever before.

Technical Papers Presented

SEVENTEEN papers were presented during the two day's meeting of the society, Nov. 19-20. These papers and complete discussions, oral and writen will be published in full in the

transactions of the society available in June, 1932. Titles and names of the authors of these papers and brief abstracts follow:

1. Determination of Stresses in Plating from Strain Measurements, by Prof. William Hovgaard, member.

The author of this paper is well known, not only in the United States but abroad, for his valuable contributions to the scientific exposition of many problems in naval architecture. In the present paper he has developed a method of determining stresses in plating by measuring the strain. He defines stress as a force per unit area whether direct (normal) or shearing (tangential) while strain is defined as the unit elongation, contraction or distortion produced by stress. Bending moments produced on a ship by external forces, such as buoyancy and gravity are distinguished from stress couples produced on any given transverse section by the moments of the stress forces about the neutral axis. Under static condition the bending moment and the stress couple acting on any given section must be equal.

The author points out that in a few cases in which strain measurements have been made on the plating of ships, only longitudinal strains were measured and the corresponding stresses were obtained by multiplying the strains and the modulus of elasticity. It is suggested that it is not safe to neglect the transverse stresses except where experimental evidence shows it to be justified. Based on this reasoning more complete strain measurements than hitherto as in the case of the Wolf tests were made on the United States destroyers Preston and Bruce at the Norfolk navy yard under the direction of Commander C. O. Kell of the construction corps of the navy. A complete set of measurements were made on the Preston by the naval construction students of the graduating class of the Massachusetts Institute of Technology and formed together with an analysis of the results the subject of their thesis. The tests on the whole were similar to those on the Wolf, but the strain measurements cover not only the upper part of the structure as in the Wolf, but also the lower, their readings being taken on the inside of the plating. Strains were measured not only longitudinally, but also transversally and in diagonal direction. The analysis shows that in many cases the transverse strains were appreciable and had an influence on the longitudinal stresses of the order up to 10 or 15 per cent.

The analysis of the Preston tests shows that with reasonable assumption as to the effectiveness of the various structural members, the modulus of elasticity, determined by a comparison between calculated and measured deflection and bending couples, correspond very closely with that of the material, about E equals 13,000 tons per

square inch.

The method is described and a mathematical analysis is presented.

2. Investigation of Structural Characteristics of Destroyers, Preston and Bruce, by Lieut. Commander Claude O. Kell (CC) U.S.N., visitor.

This is a most interesting investigation based on full size experiments of the structural characteristics of destroyers. Particularly is the investigation of value in the possibility of reducing excessive weight by a different distribution of weight in the design. Two of the destroyers recently selected for scrapping the Preston and the Bruce were selected by the bureau of construction and repair of the United States navy for use for structural research purposes. The Preston was selected for sagging tests, because of the excellent condition of her shell plating near the ends of the ship where the shearing forces would be greater. The Bruce was used in the hogging experiments. The paper relates in detail the necessary work of installation of supports to rig the destroyer Preston for the sagging tests. Cradle plates were fitted neatly to the girth of the ship and under the keel at frames 7 and 170, a distance of 285 feet 3 inches apart.

With the ship entirely supported at the ends, in certain sections the bending moments were much greater than those for which the sections were designed to withstand. This condition existed at the quarter lengths of the ship and was particularly critical in way of the knuckle at frame 154.

While the Preston was subjected to maximum bending moments amidships of approximately 31,272-foot tons, the deck stringer plates buckled generally between frames 131 and 143. The buckling was particularly pronounced aft of the transverse bulkhead of frame 137. The cause of this weakness was probably the ending at bulkhead 131 of the intermediate and outboard deck girders.

So that the results of the hogging tests might be comparable to those of the sagging tests, it was necessary to so support the Bruce that the bottom plating would not be subjected to forces other than those that exist with the ship afloat. From the results of the sagging tests, it was expected that the hull would fail in hog by buckling of the bottom strength members and shell plating. The Bruce was supported by her side shell plating.

In conclusion the author gives the following facts:

- 1. Both ships failed in compression through instability of longitudinal members. In these tests the dynamic forces and reversal of stresses experienced in service were not represented. These may or may not have revealed other weaknesses at lower stresses than those at which the longitudinal strength members collapsed.
- 2. These experiments demonstrated the importance of continuity of structure.

It is interesting to note from this paper that the studies of the failures of these destroyers point to ways of an improvement in formerly accepted details of design and that these have been incorporated in recent work.

There are many photographs and the paper is presented in a clear and interesting manner.

3. Recent Developments in Special Quality Steels for Shipbuilding, by William Bennett, member.

The purpose of this paper is to direct attention to recent developments in steel manufacture which are receiving the serious consideration of shipbuilders and engineers everywhere.

The use of wrought iron for ship construction began early in the last century, and the reason for its adoption, in preference to wood, was as much for economic reasons as for any other. The first vessel of iron was stated to have been the Vulcan, built near Glasgow, Scotland in 1819. The first iron passenger vessel to be placed on the transatlantic route appears to have been the CITY of Glasgow in 1850. In 1856 the Cunard company placed in service its first iron paddle wheel steamer, the Persia of 350 feet in length.

The use of iron for shipbuilding was well established, when, in 1873 Sir William Siemens developed the open-hearth process for making ordinary low carbon steels. The advantages of mild steel in strength and weight were immediately apparent to shipowners and the new era commenced. The tensile strength of steel, being about 25 per cent greater than iron, the thickness of the materials was reduced about 10 per cent.

The author then gives average analysis for low carbon steel. He discusses alloy steels in general, high elastic limit mild steel; admiralty D quality; stainless chrome-nickel steel; structural silicon steel; high tensile nickel steel; structural nickel steel and chromium manganese silicon steel, in each case giving a typical analysis.

He also discusses the use of high tensile castings and corrosion resisting steel.

Finally some typical cases are cited where special quality steel has been used in several notable vessels recently constructed. Among these vessels are, the Cosulich liner, Vulcania, built in 1928 in which high elastic limit steel was used over about 60 per cent of the vessel's length in the A, B, and C decks and top side shell in way of same. This represented a saving in weight of about 400 tons with corresponding beneficial effects on stability and deadweight.

In the North German Lloyd liner Bremen, built in 1928, special high tensile steel was used in parts of the top and bottom structure. The reported saving was about 800 tons. Some 7000 tons of this steel is said to have been used in this vessel. The material

was especially heat treated after rolling and all holes were drilled. The reduction in thickness allowed due to the use of this special steel is given as 10 to 12 per cent.

The EMPRESS OF JAPAN of the Canadian Pacific line built in 1930, is of mild steel throughout. In the larger and more distinguished EMPRESS OF BRITAIN completed this year, high elastic limit steel was used for about 70 per cent of the length, on the promenade and A decks and on the top side shell between these decks. In this vessel, it is of special interest to observe that no expansion joints have been provided.

High elastic limit steel has also been used to some extent in the new Monarch of Bermuda.

In selecting special quality steel it is important to make certain of requisite physical requirements to meet the conditions for which it is to be used, and that it is of reliable and uniform quality. The first can be readily established in the laboratory, the other is largely a matter of experience.

Shipbuilders have always been somewhat conservative, and rightly so, in regard to changes in the manufacture and use of materials. The use of alloy steel in nearly all other branches of engineering is increasing. In the marine field high pressures in boilers and in machinery is no longer a novelty, and it is but logical that the elastic and tensile properties of the material should keep in step. Considerations such as these provide the shipbuilder with food for thought, for, as so often happens, the specialty of today may very easily be the standard of tomorrow.

4. Notes on the Development of Certain Materials Used in Ships of the U. S. Navy, by Rear Admiral George H. Rock (CC) U. S. N., vice president.

The author states that it is the purpose of this paper to discuss some of the materials used in shipbuilding and some of the work which has been performed by the navy department through the bureau of construction and repair in the preparation of specifications for shipbuilding materials and the developments of new and improved materials.

He takes up first, steel as the most important of shipbuilding material and points out that the bulk of the structural steel used in naval vessels is standard medium steel with minimum tensile strength of 60,000 pounds and minimum elongation of 25 per cent. Use is also made in naval vessels for strength members of so-called high tensile steel with a minimum tensile strength of 80,000 pounds and minimum elongation of 20 per cent. This, the author points out, is a silicon steel and unfortunately does not lend itself to being welded. He next covers the question of corrosion resisting steel. Then paints, heat insulating material, cotton bunting for flags, anchor chain. In connection with the latter the success of tests on cast steel chain as made by the National Malleable & Steel Castings Co. is reported. The favorable showing of cast steel chain in these tests led to the final decision that cast steel chain should be adopted as standard for navy use. The use of cast steel chain by the navy over a period of 10 years has demonstrated that periodic annealing is not necessary.

Other materials considered are deck covering, aluminum furniture, manila rope and steel castings.

Admiral Rock points out the opportunities now presented to improve in material practice, but that long experience with failures in materials under the exacting conditions of service aboard ship has bred a conservatism which must act against too sudden or too radical changes in such practice. The bureau is working toward securing the proper mean between rapid material progress, so necessary at the present time in naval design and construction, and the absolute necessity of obtaining materials which will give satisfaction and long life in service. Note: A discussion by W. J. Priestley of Admiral Rock's paper appears on Page 35.

5. New Structural and Decorative Materials as Applied to Shipbuilding, by William E. Blewett, member.

It is the intention of this paper, the author states, to call attention to certain structural and decorative materials which possess characteristics of such value to the shipbuilder that their use would tend to improve the quality of our ships. In the paper each group of materials as far as practicable has been dealt with as a class.

The properties which make each material particularly useful for marine work have been noted, but no attempt has been made to pass judgment on their desirability. Deficiencies, where they have been discovered, have been noted. Various methods of installations and treatment of some materials are described where the value of the material is dependent on proper handling, or where difficulties may be encountered in its use.

In order the following materials are taken up: High elastic steels, rivets, aluminum, insulation, asphalt chocks, structural finishes, alloy steels for galleys, deck coverings, under which are included magnesite, mastic decking, sheet rubber, imitation stone, galley tile and parquet floors; composition materials: Plastic ornaments, bathroom material, swimming pool tile, metal sprayed material, hardwoods, hardwood finishes, and joiner bulkheads.

This paper represents a very interesting and valuable contribution to the art of shipbuilding in the properties of materials gained by experi-

ence and by experiments. It is a record for the benefit of others of experience gained.

6. Some Recent Developments in the Shipbuilding Art in America, by John B. Woodward, Jr., member.

The preparation of this paper, the author points out, has been suggested by the fact that during the past ten years the papers dealing with the shipbuilding art have been few.

He enumerates and discusses some interesting recent shipbuilding developments. Shipbuilding is one of the broadest of the industries in its processes, problems and contacts.

In pointing out that the free interchange of information among shipyards and ideas gathered from other industries have been an important element in the advance of the art, the author touches on one of the most vital things of the industry. This paper illustrated by views from various shipyards, will prove of great interest to everyone connected with shipbuilding, and as the author hopes, it may serve to lead others at future meetings to a more complete discussion of some of the points covered. By the interchange of such information it will be possible to build better ships at less cost and to this end all will profit.

7. Notes on the Launching of the T. S. S. Mariposa, by James B. Hunter, member.

The launching of the Mariposa on July 18, 1931, at the Fore River plant of the Bethlehem Shipbuilding Corp. under somewhat difficult conditions, provides an example of the successful coordination of the functions of the operating and technical divisions of a large shipyard.

This paper presents valuable information covering the launching data of this ship, one of the largest merchant vessels built in the United States. Among the features covered are, the construction of ways and poppets; blocking and shoring; releasing and starting gear; checking and launching procedure. Curves are also given of observed data during launching.

In conclusion the author points out that the successful launching of this vessel under very restricted conditions demonstrates that chain drags form a logical solution to the checking problem and that, when reliable data are available their effect is susceptible to calculation within fairly close limits; also that close cooperation between the operating and technical division is of great importance. The time spent beforehand in careful consideration of the problem reduces final cost and leads to a much more orderly procedure on the actual launching day.

8. Interior Lighting Aboard Ships, by Samuel G. Hibben, visitor.

Illustrated by a number of modern ship interiors where the lighting is particularly effective, the author presents valuable information on the art of ship illumination. Lighting should be planned and taken into account along with the rest of the ship and before the interior trim is placed because then and only then is it possible to have the lighting blend with the design of the room.

Various types of lighting with examples from modern ships are illustrated and described.

In conclusion the author states that lighting and the art of illumination can contribute in no small way to the coming popularity and development of American shipping and that this contribution should be sought and utilized to the fullest degree.

9. Recent Developments in Electric Propulsion, by Charles F. Bailey, vice president, and Eskil Berg, member.

A full abstract of this paper appears elsewhere in this issue.

10. Some Features of a Modern Airship—U. S. S. Akron, by Commander Garland Fulton, (CC), U.S.N., member.

It is fitting that a paper should be presented at the Society of Naval Architects and Marine Engineers on what is perhaps the greatest airship built by man. In final analysis as the author points out, airships whether military or commercial are just another means of transportation and they have no quarrel with steamships, trains or airplanes. Each has its road to play with, and there is no reason for one to interfere with the other.

There have been two large rigid airships built in the United States; the Shenandoah, patterned after a wartime German design, built by the navy department in its own plant, and the Akron, recently completed by the Goodyear Zeppelin Corp. of Akron, O. The design of the Akron goes back to 1924. The Shenandoah was completed, the Los Angeles was delivered. In order to keep abreast of developments and to be ready with a modern design, work was started at that time by the bureau of aeronautics on the design of an airship of about 6,000,000 cubic feet gas volume. This size was chosen because, figuring on helium for inflation it gave an airship of dimensions that would fit into the Lakehurst shed, an airship that could cross and re-cross the Atlantic without refueling, and an airship of comparable performance with the two British airships of 5,000,000 cubic feet volume which were to be inflated with hydrogen. This design was carried along for nearly three years, until finally merged into the design competition which served as the basis for the award of building contracts for the two navy airships, the U.S.S. Akron and sister ship, on

which construction has now commenced at Akron, Ohio.

Much of interest will be found in the text and illustrations of Commander Fulton's paper. Among the illustrations is a general arrangement drawing of the U.S.S. Akron.

11. Model Experiments to Determine the Effect Upon Resistance of Variations in Length of Entrance, Beam, and Rise of Floor, by Prof. Edward M. Bragg, member.

In this paper the results are given from the latest experiments made upon a model that has been under test for about ten years at the University of Michigan naval tank. The author gives a brief history of these tests, the first of which were undertaken at the request of the United States shipping board in the year 1919. Excluding the nine preliminary forms, the total number of models tested so far in the 1130 series has been 116. The models have all been for cargo ships of dimensions 425 feet in length by 56foot beam down to a 400-foot ship by 52.7 feet beam.

The present paper gives the results for two sets of tests. In one the beam and per cent of entrance were varied, the forebody sections being V shaped while the run was of a constant length equal to 40.5 per cent, and the shape of the after body sections was bulbous. In the other tests there are changes in the rise of floor and in the beam for two percentages of entrance, 33.9 per cent and 40.7 per cent. One of the conclusions arrived at that the results show at low drafts the fining should be done longitudinally, as increase in the rise of floor causes increase in resistance. An increase in rise of floor would more likely be of benefit at the deeper draft.

12. Model Steering Tests, by L. F. Hewins and Lieut. W. P. Roop (CC) U.S.N., visitors.

This paper touches upon an important feature of ship design which has not always had the benefit of informed analysis. The authors point out that this is probably due because the model method has not been extensively applied, partly due to the difficulty and high cost of model steering tests.

The attack on this problem at the United States experimental model basin has dealt with the turning ship. Data are presented in the paper show that close correspondence with full scale data can be obtained when sufficient efforts are extended. In the full scale tests data were determined on the turning circle, angle of heel, and torque in rudder stock, all referred to the same rudder angle and time scale. The force reactions on the rudder were also measured on the model. Agreement in the quantities compared gives confidence in calculation of reactions on the full scale rudder by reference to model data.

Such data as those summarized in this paper when extended systematically to a wide range of conditions would naturally be used for evaluation of empirical constants in a theory of steering. Ultimately, this line of approach must be followed. For the present it is felt that neither theory or experiment is adequate for such an undertaking. When more extensive facilities become available the problem will doubtless be taken up again at the model basin and systematic tests carried out. In the meantime model steering tests will be limited to those made for specific purposes.

13. On the Analysis of Ship Trial Data, by Karl E. Schoenherr, member.

In this paper a method is given of interpreting the ship trial data with the effects of the wind, the weather and the tide so that comparison between such data and the model test can be made to clear up some of the uncertainties still present in the model basin method of estimating the power of ships. By the method offered in the paper only two runs at any particular speed, one in each direction of the trial course are necessary, instead of the three or five runs required by present methods.

The method is based on the laws of propeller action. At any given revolution per minute and a given speed of advance, a propeller delivers a definite amount of thrust and absorbs a definite amount of power. This relationship can be expressed in mathematical forms. In this manner the effects of air and weather and tide are eliminated. Having thus completed the correction of the trial data the calculation is reversed in order to get the actual corrected values for the shaft horsepower, the revolutions and the speed. It is emphasized that these values are corrected down to the model conditions, that is for no air resistance whatsoever. In order to find the shaft horsepower for any given strength of wind the power to overcome the wind resistance is calculated by mathematical formulas proposed by the author.

Though of necessity, mathematical in its treatment, this paper discusses in a very interesting and logical manner the directly practical problem of being able to actually determine the power and speed for full size ships for model experiments.

14. Arc Welding in Shipbuilding, by Harry W. Pierce, visitor.

In this paper practical application of arc welding in shipbuilding is described and illustrated by examples of various types of construction. The author reviews facts and fundamentals without confusing details and he describes the progress dur-

ing recent years. The advantages and objections of fusion welding in general, and the electric arc in particular are briefly and clearly stated. The problem of design is considered; also erection and welding procedure and material and inspection. This paper is quite fully illustrated.

In conclusion the author states that it is not his intention to say that welding can or should replace all riveting in ship construction. The essential point made by the author is that welding is a good method, and that insofar as the connection is concerned, it should be unquestioned when properly designed and made in weldable material, as with riveting. Its use should be limited, therefore, not by criticism or bias against it as a method where its value has been amply demonstrated, but by an economic consideration of each case.

15. Design of American Super Liners, by Theodore E. Ferris, member of council.

We have referred to this paper earlier in this article as "monumental." This is not an exaggeration as this paper presents a mass of most valuable information which was obtained only after several years of labor and study by the author in cooperation with the leading authorities on naval architecture and marine engineering.

The design calls for vessels of the highest class on a light weight less than 50,000 tons, that have four-compartment subdivisions, that will pass through the Panama canal locks, that have low resistance, that have machinery equipment capable of developing 180,000 or 200,000 maximum horsepower, a top speed of about 31 knots, and that have accommodations for over 1000 first class and a total of about 2800 passengers.

The author gives in workable detail all of the characteristics and particulars of design. Both geared turbine drive and turbine electric propulsion are considered with suitable characterictics of the ship noted in each case. A description is given applicable to both geared turbine drive and electric drive ships. What might almost be considered a complete itemized specification of all the principal features of propulsion and auxiliary machinery is given. This applies for both geared and electric drive.

Many features of design of the hull, including body plans of two models are given. Consideration of subdivision is gone into fully. No less than 13 plates covering design of hull, passenger quarters, machinery spaces, midship section, bow and stern arrangements, including rudder, are published with this paper.

The discussion which followed the paper was almost entirely in an appreciative vein with little criticism of any of the technical features. This is partly explained by the immensity of the subject and partly by the lateness

in receiving copies. Mr. Ferris in replying to the comments on the paper expressed his thanks to the members of the society for the cordial reception it had received and that he considered all of the criticism constructive and that he would reply fully in writing. A rising vote of thanks of the society was unanimously accorded the author for his splendid paper.

16. Electric Auxiliaries on Shipboard, by Walter E. Thau, council member.

The purpose of this paper is to discuss the use of electric driven auxiliaries on shipboard with the particular idea of justifying their overall economics in comparison with steam driven auxiliaries. Modern engineering is usually in agreement in regard to the general superiority of electric driven auxiliaries; however, there do exist differences of opinion as to their economic merits and the extent to which they should be used. In analyzing this subject it is necessary to give due consideration to all factors bearing upon the overall economics such as first cost installed, operating cost and maintenance. Installed cost includes all related items such as first cost of machinery and fittings, piping, wiring, grating, foundations, engineering, drafting, supervision and labor. Due credit is given to reduction in boiler and other ancillary equipment costs proportionate to reduction in steam generation in order to place the analyses on a true comparative basis.

The scope of the paper is confined chiefly to the analyses of two major cases in order to avoid unnecessary complication and undue length. These cases are: 1. A 5000 shaft horsepower single screw cargo vessel. 2. A 30,000 shaft horsepower twin screw passenger vessel carrying a certain amount of cargo. In both cases the analyses are made, first using steam driven engine room auxiliaries and, second, using electric driven engine room auxiliaries.

Deck auxiliaries are discussed separately for the sake of clearness.

A brief discussion is also included on special systems which further augment the economics of electric auxiliaries.

In conclusion the author summarizes a few of the important facts.

- 1. Electric auxiliaries pay for themselves.
- 2. Electric auxiliaries provide better working conditions for the crew.
- 3. Electric auxiliaries afford better comfort to passengers and crew.
- 4. The additional cost of electric auxiliaries is a negligible per cent of cost of the ship.
- 5. Further application of sound engineering principles to electric auxiliaries will make them more advantageous and reduce the already small cost differential.

- 6. It is extremely difficult to obtain reliable operating data on auxiliaries. It would be very helpful to the art and would assist in reducing operating cost if more of the ship operators would keep accurate and systematized records of the operating performances of steam and electric auxiliaries and interchange their findings.
- 17. Pumps for Marine Service, by Irving W. Jackman, member, O. H. Dorer, H. M. Chase, visitors.

It is the intention of the authors in this paper to indicate the general features that must be considered in selecting suitable pumping auxiliaries for ships, taking into consideration the limiting features of design, and placing particular stress on an economic selection from the point of view of the owner, shipyard and pump manufacturer.

It is pointed out that the selection of pumping equipment for the modern ship requires a more careful study of the actual operating conditions than in the past. The more common steam pump of the past, with its wide range of capacities and pressure ratings, required less accurate selection than the modern motor driven centrifugal with its limited range of flexibility.

Higher pressures, larger capacities and a demand for greater economy now require careful consideration of the type of pump and its prime mover. This paper deals only with pumps handling liquids as distinguished from those handling air or noncondensable vapors.

Pumps can be generally classed into four groups: A. centrifugal, B. power (reciprocating), C. steam (reciprocating), D. rotary. Under each of these classes there are certain general limitations.

This paper should prove of real value to the engineer responsible for the design and layout of pumping arrangements for ships. Under various chapter heads the author takes up the selection of a pump for a given service; general characteristics of centrifugal pumps, of reciprocating and rotary pumps; main feed pumps, ordinary feed pumps, drain pumps, lubricating oil pumps, fuel oil pumps, ballast pumps, fire pumps, fresh water pumps, vacuum and condensate pumps, cargo and loading pumps.

This paper is a valuable contribution to the transactions of the society and gives a fund of useful information which will find practical use.

Membership of Society Increased

REPORT of the secretary-treasurer of the society of Naval Architects and Marine Engineers shows that the society is in a sound financial condition. The general fund balance Nov. 1, 1930, was \$24,769.16. The net in-

come for the year ended Oct. 31, 1931, after providing for total expenses of \$22,934.42, was \$3075.85. Adding this amount to the balance of Nov. 1, 1930, and deducting \$5000 transferred to endowment fund, the general fund balance Oct. 31, 1931, was \$22,845.01. The endowment fund balance Oct. 31, 1931, was \$125,051.85 represented by \$16,-842.02 cash in savings banks and \$108,209.83 in investments at cost. From this fund appropriations are made for the society's scholarship in naval architecture of \$1000, a cash prize of \$500 and toward the expenses of indexing the proceedings of the society.

It is interesting to note that a total of 125 new members were elected at this meeting, in the following categories: Members, 75, associates, 26 and junior, 24. By this addition the net membership of the society has again been increased. The membership Oct. 31, 1930, was 1390; on Oct. 31, 1931, the membership was 1550. After the meeting of the council which acts on new membership, Nov. 18, 1931, the membership of the society stood at 1675, after deducting 21 removed by deaths; 29 resigned; 56 suspended and 7 reinstated.

J. Howland Gardner, elected last year as president of the society for a term of three years continues as president. Other officers and council members were elected at the thirtyninth general meeting as follows:

Officers and Council Members Elected

Honorary vice presidents: Charles P. Wetherbee, William A. Dobson. Vice presidents: Ernest H. Rigg, William L. R. Emmet, William H. Todd, Morris Douw Ferris, John F. Metten and Daniel H. Cox. Council members: William L. R. Emmet, Theodore E. Ferris, William W. Smith, Frank M. Lewis, Walter E. Thau, John E. Burkhardt, David Ernott, and H. H. Brown. Associate council members: Henry E. Cabaud, James Plummer, Edward G. Sperry and Robert F. Hand. Executive committee: Washington L. Capps, Joseph W. Powell, Homer L. Ferguson, Charles A. McAllister, Morris Douw Ferris, Richard H. M. Robinson and Hugo P. Frear, Secretarytreasurer: H. Gerrish Smith. Assistant secretary-treasurer: Thomas J. Kain.

The annual banquet of the society was held at the Waldorf-Astoria on the evening of Nov. 20. The president of the society, J. Howland Gardner presided as toastmaster. The surviving original charter members of the society who were present might well have viewed with satisfaction the brilliant setting in the magnificent grand ballroom of the new Waldorf-Astoria with the modest beginnings of the society 39 years before. In all outward aspects it represented the progress of the nation in wealth and power and along scientific lines in naval architecture and marine engineering. Singing of the national anthem by Mrs. Robert L. Hague, soloist, will not soon be forgotten.

The principal speaker of the evening was Lewis Nixon, former naval officer and shipbuilder, who gave his reminiscences of the early days in building the first modern American navy. Count Erensto Russo delivered a very entertaining address. The departure at this banquet from the custom of numerous long speeches was received with general approval. The annual foregathering of the members of the marine industry as represented by the banquet of the society is a time for renewing old acquaintance and is a social bond of much value.

Dry Docking and Repairing at Atlantic Works

At the Atlantic Works of the Bethlehem Shipbuilding Corp., two floating dry docks and three marine railways are available for taking care of vessels which come in for repair work and overhauling. Their general capacities are as follows:

One 5500-ton floating dry dock. Length on keel blocks, 380 feet 4 inches. Breadth at top of keel blocks, 70 feet 8 inches.

One 360-ton floating dry dock. This is one of the smallest floating dry docks in use. Length on keel blocks, 72 feet 4 inches; breadth at top of keel blocks, 32 feet 0 inch.

One 2000-ton marine railway. Length on keel blocks 237 feet 9 inches. Breadth at top of keel blocks, 68 feet 0 inch. Depth of water over keel blocks on outboard end at high tide 16 feet 0 inch. Depth of water over keel blocks on inboard end at high tide, 10 feet 0 inch.

One 1000-ton marine railway. Length on keel blocks, 200 feet 0 inch. Breadth at top of keel blocks, 58 feet 0 inch. Depth of water over keel blocks on outboard end at high tide, 18 feet 0 inch. Depth of water over keel blocks on inboard end at high tide, 12 feet 0 inch.

One 500-ton marine railway. Length on keel blocks, 133 feet 2 inches. Breadth at top of keel blocks, 28 feet 6 inches. Depth of water over keel blocks on outboard end at high tide, 14 feet 0 inch. Depth of water over keel blocks on inboard end at high tide, 10 feet 0 inch.

There are six wet slips and outfitting basins which have a mean low water depth varying up to 25 feet for the deepest. Plenty of berthing space is available as follows: Pier No. 1—North side, 300 feet 0 inch; Pier No. 2—South side, 400 feet 0 inch; Pier No. 2—North side, 300 feet 0 inch; Pier No. 3—South side, 300 feet 0 inch; Pier No. 3—South side, 300 feet 0 inch; Pier No.

A description of the dry docking and repair facilities of the Atlantic Works of the Bethlehem Shipbuilding Corp., modernization of which was described in the November issue of Marine Review.

3—North side, 40 feet 0 inch; Pier No. 4—South Side, 110 feet 0 inch; Pier No.

4—North side, 140 feet 0 inch; Pier No. 5—South side, 140 feet 0 inch; Pier No.

5—North side, 130 feet 0 inch; Pier No. 6—South side, 130 feet 0 inch.

On Pier No. 2 is a 15-ton traveling jib crane which with the 10-ton caterpillar crane gives ample facilities for handling material on the docks. The 10-ton crane can go out on piers and handle material for dry docks and railways.

At one end of Pier No. 3 are located underground oil storage tanks having a total capacity of 40,000 gallons. A pump house is located underground adjacent thereto and steam connections are provided for heating the oil in cold weather.

All piers are equipped with air, salt and fresh water lines. Pipe lines are easily accessible at all points not only on the piers but throughout the yard.

A shear leg originally built for handling boilers, heavy spars, etc., is good for a load of about 100 tons. This shear leg has long been a landmark pointing out the location of the Atlantic works.

Auxiliary equipment has been provided as follows: Three gasoline work boats, one 75-ton scow, 8 automobile trucks, 4 automobiles.

Three Leading Italian Ship Lines Merge

Three leading Italian steamship lines, the Navigazione Generale Italiana, Lloyd Sabaudo and Cosulich lines were merged into one fleet at a meeting of the three directorates in Milan, Italy, on Oct. 3. At the same time three smaller companies, Sitmar, Marittima Italiana and Lloyd Triestino, merged into a company which will be called Lloyd Orientale.

The new Italian shipping combine will have its headquarters in Rome and will present a total strength of more than 107 ships, including some of the world's largest transatlantic liners and scores of substantial freighters, engaging in passenger and freight traffic to a great extent with North and South America.

The N. G. I. has 19 ships, including the Augustus and Roma, of over 32,000 tons each, on the New York run. Next year the line plans to put into the New York run the huge liner REX, recently launched, which may prove to be one of the fastest liners afloat. The Lloyd Sabaudo has 10 ships, including the CONTE GRANDE and CONTE BIANCAMANO, each over 24,000 tons. The Cosulich Line has 22 ships, including the SA-TURNIA and VULCANIA, each of 24,000 tons. The Sitmar Line has 16 ships, the largest of which is 13,000 tons. The Societa Marittima Italiana has six ships, and the Lloyd Triestino Line 44.

Electrical Propulsion Developments

Early Installations of Electric Propelling Machinery—This Type of Power Successful in Wide Range of Vessels—Has Advantages Not Possessed by Other Types of Drive

By Eskil Berg and Charles F. Bailey

THE earliest practical installations of electric propulsion in the United States were in two Chicago fireboats in 1908. These vessels are still in service. The first large installation was in the United States Collier Jupiter with about 5400 shaft horse-power, commissioned Sept. 15, 1913. In 1920 to 1922 this vessel was converted to the aircraft carrier Langley with the original electric propelling machinery, which is still efficient and reliable.

Among the many smaller installations of turbine electric or diesel electric propelling machinery which have been remarkably successful are towboats, trawlers, yachts, fireboats, dredges, salvage boats, oil barges, oil tankers, ferryboats, carferries, and coastguard cutters. Among large vessels are United States battleships, aircraft carriers and many of the larger and superior new American merchant vessels.

For small boats, this type of propulsion is often with bridge control, with diesel driven generators. Diesel electric drive lends itself well for services requiring low standby losses, since, but a few minutes are necessary for getting under way from a cold start.

In yachts of large power, turbine electric drive with its quietness and freedom from vibration and from propeller racing, is gaining recognition.

This form of drive has been used in battleships from about 1918, when the New Mexico was commissioned, followed by all of the subsequently built United States battleships. The New Mexico was originally designed for gear turbines, and, therefore, not properly planned and subdivided to take full advantage of electric propulsion. This vessel is now being fitted with turbines and gears largely for this reason.

The aircraft carriers Lexington and Saratoga which were commissioned in 1927 and 1928 have furnished valuable experience and information in connection with large installations for other jobs.

An important step in the development of electric propulsion was the adoption in 1920 of synchronous motors in the S. S. Cuba, which type has been largely used since.

Paper No. 9 on Recent Developments in Electrical Propulsion by Eskil Berg and Charles F. Bailey, presented before the Society of Naval Architects and Marine Engineering at thirty-ninth annual meeting held in New York, Nov. 19-20, 1931.

The application of electric propulsion to large passenger and cargo vessels began about 1927 with the S. S. California of the Panama Pacific line with 17,000 shaft horsepower. The excellent performance of this vessel, the freedom from vibration, the remarkable maneuvering qualities, and fuel economy created great popularity. The succeeding vessels for the same line were delivered in 1928 and 1929.

These vessels were followed by the installation of electrically propelled machinery in the S. S. Santa Clara, Morro Castle, and Oriente, the first with 12,000 horsepower and the last two each with from 14,000 to 16,000 shaft horsepower. All of these vessels are fitted with twin screws.

The two outstanding electric propelled vessels in this country are the Dollar line steamers President Hoover and President Coolinge. These vessels are alike in all general particulars ex-

S. S. President Hoover

Standardization Trials

June 18, 1931

Table 1

26 feet 1/8 inch mean draft; displacement, 24,400 tons.

Speed Average

No. Runs		r.p.m.	S.H.P.
3	15.514	94.85	8,929
3	17.179	106.43	12,499
3	18.411	115.12	15,764
3	19.631	123.80	19,820
3	20.504	131.42	24,250
5	21.558	141.48	31,060
Highest speed	22.2	143.36	32,537
일하는 것들이 하는 것 같아 지난 이번 살이 가면 하는 것이 없는 것이 없는 것이 없는 것이 없다면 하는데 없는데 없다면 없다.			

cepting that the electric propelling machinery and most of the engine room and deck auxiliary electric machinery are of different makes. The machinery in the President Hoover was designed and built by the General Electric Co. and that in the President Coolinge by the Westinghouse company.

The electrical contractors worked independently without consultation or conference with each other excepting through the shipbuilder, who compared their calculations, water rates, torque margins, power, revolutions, weights, general dimensions, temperature rises and other important points.

The President Hoover was standardized June 18, 1931, on the Rockland mile, and afterwards ran sea trials during which accurate measurements of the power and the fuel oil consumptions were made. These data are

tabulated in Tables 1 and 2.

The President Coolinge was not standardized but ran full trials at sea off the Virginia capes, using the Hoover's standardization curves. During these trials the same careful measurements of power and fuel were made as on the President Hoover. These comparisons are tabulated in Table 3 and show the close agreement in the essential particulars of the two vessels.

When we bear in mind that the main propelling machinery and electrical auxiliaries and most of the numerous motors and auxiliaries for deck, large refrigerating plant and general ship's services, nearly 200 in number on each vessel are of different makes, the results illustrate the accurate design and construction work of the electrical companies as well as uniformity of operation by the crews.

In Tables 1 and 2 summaries are given of the standardization runs and the economy runs for the PRESIDENT Hoover at full power with both propulsion generators in operation, and also data at half power with only one propulsion generator in operation. A corresponding run was made at half power with two propulsion generators driving the vessel. The difference in fuel oil per shaft horsepower on these two runs is interesting and shows a saving in oil per shaft horsepower when operating with one generator. Attention is called to the number of boilers in use which has a bearing on the comparison.

In Table 3 are the corresponding average pressures and other data taken during eight-hour economy trials of the President Hoover and President Coolidge. Corrections for steam pressure, superheat, vacuum, sea water temperature, number of circulating pumps in operation, and hotel load for the President Coolidge to the same basis as the President Hoover trial would indicate that the fuel consumption for the two ships is substantially the same.

Six vessels for the United Mail Steamship Co., each of 10,775 tons displacement fitted with twin turbine generators to give 10,500 horsepower and twin screws each driven by a three-phase synchronous induction motor of 5250 horsepower at 125 revolutions per minute are now building in the United States. One of the turbine generators can deliver 5500 horsepower to the motors at 102 revolutions per minute.

In these installations considerable

advance is made over previous electric propulsion jobs in this country. The boiler pressure is raised to 350 pounds gage with 230 degrees Fahr. superheat, corresponding to 666 degrees Fahr. temperature. Both the generators and the propulsion motors are fitted with close circuit air coolers, the first merchant jobs in this country to have this type of cooler for the propulsion motors. There are three 500 kilowatts direct current generators for excitation and miscellaneous ship service.

Use of Electric Propulsion Abroad

There are several conspicuous examples of foreign electric drive installations, among which are the SAN Benito, a passenger and cargo vessel of 3000 horsepower, built in 1921. The Viceroy of India with 17,000 horsepower for the P. & O. Steamship Co. was put in service in 1928. The Musa and Platano, each of 6750 horsepower and also the reconditioned Dariem of 3300 horsepower of the

increased the reliability and reduced the weight and space required, it is natural that American naval architects, shipbuilders and operators should look with favor upon electric propulsion for large liners.

Certain outstanding favorable characteristics common to electric propulsion are possessed by no other type of drive. Several of these advantages have been cited for small vessels which also apply to the large liners and in some cases to a much greater extent. The following should be emphasized in connection with such vessels:

- 1. Since the prime movers are not directly connected to the propeller shafts, the disabling of one or more of these does not vitally impair the operation of the ship, as all the four propulsion motors may be run from the remaining generators or from any one of them.
- 2. Even with reduced powers, with some of the prime movers idle, a high efficiency can be obtained from those still in service as they would be oper-

through the motor air gap.

- 9. In a ship of this size there is small likelihood of the propellers coming out of the water due to pitching, but still it is reasonable to expect that higher speeds under heavy sea conditions would be safely maintained with electric drive than with turbines and reduction gears.
- 10. There is no varying and suddenly changing pressure as there would be on gear teeth in transmitting the torque. Such contact in gears is replaced by the cushioning effect mentioned in No. 8.
- 11. The connection of the various units of electric propulsion by cables rather than in a rigid construction permits favorable distribution of parts and weights, and also an arrangement of downward exhaust from the turbine to the condenser, which is logical in theory and practice.
- 12. Such an arrangement of machinery permits excellent ventilation and tends to a cool engine room, a more contented crew and less congestion.
- shaft horsepower up to slightly above 200,000 shaft horsepower in such an installation, it is entirely feasible to fit only one motor to a shaft. If these powers are greatly exceeded it would be advisable to fit double motors to each shaft in order to avoid increasing the weight of individual parts abnormally. With a single motor per shaft the control is somewhat simpler.

S.S. President Hoover—Sea Trials—Economy Runs

June 17-19, 1931

Table 2

Date - June	17	18	19	19
Time	8.00 10.00	p.m. 4.00 12.00M	a.m. 9.00 12.00 N	p.m. 12.15 Joon 2.15
No. generators in use	2 12 99.74 10,519 16.22	2 12 134.4 26,495 20.83	1 6 101.67 10,999 16.52	1 6 103.9 11,792 16.83
Fuel oil, pounds per shaft horsepower per hour, corrected to 18,500 B.t.u. oil	.847	.0669 .0750	.772	.766

United Fruit line were put in service in 1930. The STRATHNAVER and STRATH-AIRD with 28,000 horsepower each, of the P. & O. line and another vessel the Rangatira of 13,500 horsepower for the Union Steamship Co. of New Zealand are the most recent foreign passenger ships of this type.

The Furness-Bermuda line is building a passenger and cargo vessel, the MID-OCEAN of 19,000 horsepower, and the French are building a very large passenger vessel with high power for Atlantic service. A number of diesel electric propelled vessels of foreign register were put in service in 1924, 1927 and 1930.

For Use on Large Ocean Liners

At the present time there is great interest in large high powered ocean liners. A number are in service and several European nations are now building such vessels. During the last few months careful studies have been made for such liners equipped with electrical propelling machinery as well as with geared turbine machinery. Since the improvements in such machinery in large powers as applied in the aircraft carriers Lexington and Saratoga have raised the efficiency,

ated near rated capacity.

- 3. Flexibility in the location of the machinery assists greatly in the distribution of weights for proper trim of the vessel.
- 4. The main turbines and generators can be located near the boilers, which reduces the length of steam piping with saving in losses, space, weight, cost and complication.
- 5. Location of the motors aft avoids long propeller shafts, some of which would probably require to be run through the boiler rooms if turbines and reduction gears were fitted.
- 6. Each pair of propelling motors can be placed in a separate water-tight compartment or each individual motor can thus be isolated.
- 7. The main turbines always run in the same direction. Since there are no reversing elements in the turbine, the losses due to windage are eliminated and there are no sudden temperature changes in the turbines. Weight and space are saved.
- 8. The reduction of noise and vibration is particularly notable. This may be partly due to the separation of the propeller shaft from the prime mover and to the cushioning effect between the motor stator and rotor

Design for a Large Vessel

To discuss this matter in more detail, we will consider a design for a large vessel, capable of passing through the Panama canal with from 145,000 normal to 180,000 maximum shaft horsepower. The boiler working pressure is taken at 425 pounds gage, giving 400 pounds and 700 degrees Fahr. temperature at the superheater steam outlet. By using steam at the superheater outlet of 600 pounds pressure with 750 degrees Fahr. temperature, a saving of about 0.02 pound in oil per shaft horsepower at both normal and full power without air heaters would result. About .025 pound further gain in each case will result if air heaters are used. Balancing increased weight of boilers, piping, turbines and auxiliaries, the greater complication, the larger crew and upkeep and the very considerable space occupied upon the lower deck if air heaters are fitted, against the simpler and lighter installation without increased pressure and/or air heaters, it can be determined if the increase in thermal efficiency is warranted. In this example, all the auxiliary power, including excitation and ship's service, cooking, heating and ventilating, has been considered as furnished by turbine geared generators rather than by diesel driven sets, owing to the greater freedom from vibration and noise.

With such an installation, four turbine generators will be installed, each of 45,000 shaft horsepower maximum and four synchronous-induction motors, one for each propeller shaft operating at 174 revolutions per minute maximum. The generators will be three-phase, about 75 cycles, 6000 volts. To avoid excessive lengths of steam piping and for trim and increased safety the turbine generators will be installed in two engine rooms with one group of boilers forward of the forward engine room and the second group aft of the after engine room.

With four generators and four motors there are several combinations of inter-connection possible. Only eight are considered necessary to provide sufficient flexbility for emergency or reduced power operation. Four of these combinations would be, each generator supplying all the four motors. Under certain conditions one complete engine room could be shut down, and with the two propulsion generators in the other engine room, at least 75 per cent speed attained with efficient operation.

Governors for Speed Control

The speed of the propulsion motors is varied by changing the turbine speed setting through hydraulically operated governors manipulated from the central control station.

An auxiliary machinery room will be located common to the two engine rooms.

The propulsion motor rooms will be located aft of the after boiler room, the two outboard motors forward and the two inboard motors somewhat aft. Each pair of motors will be in separate watertight compartments.

Auxiliary machinery will be generally electrically operated, current for which will be supplied by auxiliary alternating current generators.

Excitation for the propulsion generators and synchronous motors will be provided by three turbine driven, double unit (2 x 400 kilowatts) direct current generators, one for each engine room with the third as a spare.

Keeping Motors in Step

To prevent the motors from pulling out of step with the generators in case of rough weather or unusual turning, the propulsion machinery will be liberally designed to provide a motor torque margin of not less than 30 per cent at 45,000 shaft horsepower per motor.

The propulsion generators will have the closed circuit system of ventilation provided by surface air coolers and internal fans on the rotors. This reduces the noise and aids in

keeping the generator windings clean.

For the propulsion motors external motor driven blowers will be fitted to exhaust air from the motors and discharge it through surface air coolers into the motor room, for again circulating through the main motors, the motor being closed.

Control of the main propulsion machinery will be from a central station located where most convenient for cable leads and where best protected from possible damage by collision. With central control, the engineer in charge has a contact with the machinery which cannot be obtained with any non-electric propulsion system.

By means of the instruments on the control panel, the engineer can measure the actual power delivered to the propellers, momentarily or for any part of the voyage or for the entire trip. This information will assist in the accurate calculation for fuel consumption, in observing the division of load between the different included in air heater boxes, uptakes, additional ducts and greater fan capacity required. The engineer crew would be increased, top side weights would be more, and the machinery would be somewhat modified. The heater boxes would encroach on the lower deck area to the extent of 3000 to 4000 square feet, thus reducing valuable pay deck space. The air pressure would be increased and there would be more burners required. Any operating company before building a large liner would go carefully into the merits of a simple installation as compared with a more intricate one.

Simpler System Advantageous

The authors believe that at the present time the overall advantages of the simpler system with the less pressure and temperatures are to be recommended. Instead of particularly stressing making this the most economical ship as regards fuel consumption, the authors are considering the problem from a standpoint of the

Data S.S. President Hoover and Coolidge

Table 3

	Hoover	Coolidge
Mean displacement tons	24.330	22,927
Total S.H.P	26,495	27.089
Propeller r.p.m	134.4	
Boiler pressure lb. per sq. in. gage	289	136.43
Turbine chest pressure—lb. per sq. in. gage		294
Superheat at turbine OF	266	270
Superheat at turbine °F	196	211
Vacuum (referred to 30" barometer), inches Hg	28.80	28.58
Temperature of sea water °F	55	74
No. of circulating pumps in operation	2	4
Total D.C. electric load, kw	660	885
Fuel oil consumption, lb. per S.H.P. hr. corrected to 18,5000 B.t.u. pound	.669	.705

shafts, and detecting bearing trouble.

For the large amount of auxiliary electric power required by a vessel of such size, there will be four 1800 kilowatts, three-phase, 440-volt, 60-cycle turbo alternators. Two will be located in each engine room and these machines as well as the exciters and motor operated auxiliaries and other circuits, will be controlled from an auxiliary switchboard in each main engine room. In addition there will be two or three 150-kilowatt motor generating sets for obtaining the required voltage for various special services.

In the calculations for fuel oil consumption previously given with steam at 400 pounds gage, 700 degrees Fahr, temperature at the superheater steam outlet, the boiler chosen would operate at about 81 per cent efficiency at sea in ordinary running at full power without air heaters or economizers. With 600 pounds pressure and 750 degrees Fahr. temperature, it would seem advisable to install air heaters and some might go so far as to also install economizers. With the design of boiler selected, where there would be a gain in thermal efficiency and also in terms of fuel oil per shaft horsepower, there would, however, be increased weight

ledger balance after five or ten years of operation. They have emphasized simplicity, lightness of weight and economical operation with respect to crew and upkeep. The consumption per shaft horsepower on the basis of oil at 18,500 B.t.u. without air heaters, is estimated at 0.62 pound per shaft horsepower, both for 145,000 horsepower and also at full power of 180,000 horsepower with 400 pounds at 700 degrees Fahr. at the superheater steam outlet. The corresponding figures with 600 pounds pressure and 750 degrees Fahr. are 0.616. This small gain is mostly due to the increased temperature rather than to the higher pressure. Both figures include all auxiliary consumption, galleys, heating, ventilation and fuel oil heating, refrigeration, makeup feed, etc. which have been carefully estimated and included with that of the main turbine. The calculations are based on boiler efficiencies obtained on reliable tests without air heaters or economizers.

The use of air heaters, three-stage instead of two-stage feed, heating and motor driven instead of turbine driven, main feed and fuel oil service pumps would further reduce the fuel rate to the following: 0.58 for 400 pounds and 700 degrees temperature

and 0.56 for 600 pounds and 750 degrees temperature. If diesel driven generators for ships service were used, the fuel rate would be still somewhat further reduced.

The authors would advocate trying the higher pressure and temperature in a smaller way by any large company contemplating great expenditures in such liners. For the unprecedented installation outlined, simplicity of construction and operation with reduction of top weights are worthy of consideration. The problems in marine installation are obviously quite different from those in stationary plants.

A few outstanding points may be mentioned with regard to this machinery as compared with turbines and gears. Most engineers would approve an arrangement of motor rooms aft of the fireroom rather than an arrangement with one geared turbine room amidships which involves long shafting extending outboard of or through the after boiler compartment. The electrically propelled ship gives shorter shafting, less vulnerability, and shorter steam pipes.

Closely approximate estimates of weight have been made covering in detail the propelling machinery installation, including boilers, fire room equipment, all auxiliaries, engine room equipment, shafting, stern tubes, propellers, ladders and gratings, floor plates, foundations, etc. These estimates indicate some difference, depending upon the types or makes of machines installed. There is considerable variation in practice, particularly with regard to design and construction of geared turbines. In certain installations the machnery with geared turbines would be heavier than with electrical propelling machinery, and in others the conditions would be reversed. However, with proper design the total machinery

weights with electrical propelling machinery would be no greater than with geared turbines, in fact, detailed estimates, carefully made, indicate that with the large powers involved and the arrangements of machinery considered in these vessels, the total weight with electrical propelling machinery will be substantially less than the weight with corresponding geared turbine installation.

The better licensed steam engineer has proven himself capable of assuming charge of the machinery of the turbine electric propelled vessel. Except for the few weeks spent at the plants of the manufacturers during the assembly and testing of the machinery and at the shipbuilder's yard, the chief engineers assuming charge have not had extended previous electrical experience. The transmission of power electrically from the prime mover to the propeller shaft, which involves only the generator, motor, and control apparatus, has in no case proven to be the major part of the problem of the machinery operation.

It does not seem to make any particular difference if the engineers receive their training at the plant of the manufacturers, at the shipbuilders' works, or on the ship after the machinery has been installed. Engineers holding minor positions have been advanced to positions as chiefs and have made good records without further special instruction.

Electric-drive ships hold their personnel, which may be interpreted as meaning that the ships are both popular and exceptionally easy as to the labor involved in upkeep. It has also been found that the electric-drive ship attracts a high class of engineers, who are proud to be associated with the modern form of drive.

Actual operating economy obtained on turbine electric propelled

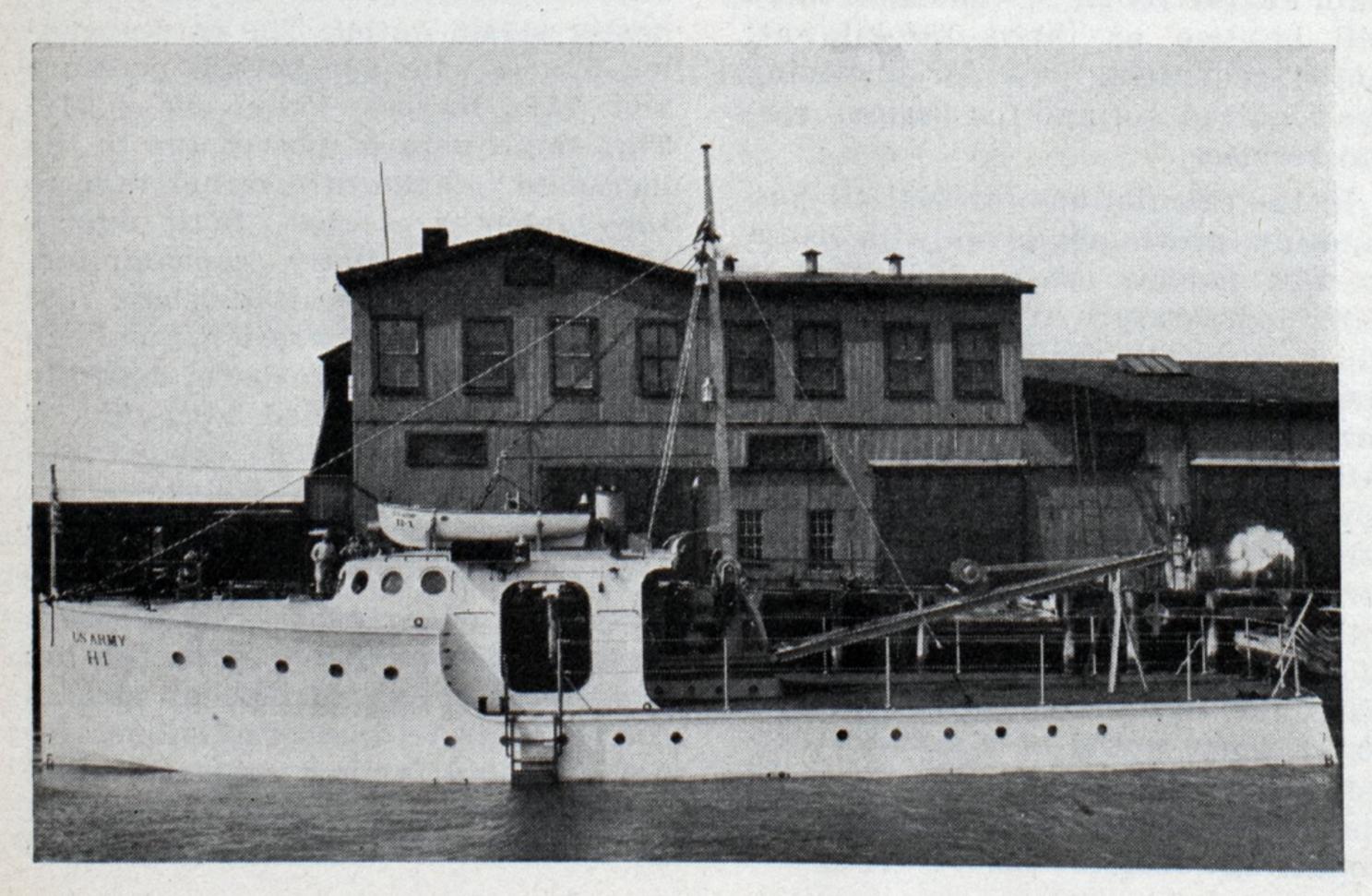
ships in service has come through two channels, one being the small cost of upkeep and the other the low fuel consumption. The first has been a great satisfaction to the owners of turbine electric ships and has hardly been given the publicity that it warrants. The total fuel consumption of all turbine electric propelled ships has been less than expected, and the observed horsepower to drive the ships has also been lower.

Some may consider that greater economy than has been indicated in the analyses of the large ocean liner could be realized in service, and we know that this is so when thermal efficiency alone is considered. However, the authors are taking into account the first cost, interest on investment, insurance and all capital charges, the crew, subsistence, wages and maintenance, also quarters, paying deck space and the wear and tear upon the apparatus required, also the deadweight necessary to carry around and the power to transport such weight, all of which must necessarily mean if the highest thermal efficiency is the aim, some enlargement of the vessel itself in certain particulars which would again add to the displacement.

When this paper was written there were about 73 turbine electric ships of different classes in service or under construction, having a total of about 1,135,000 shaft horsepower. There are also 129 diesel electric propelled vessels with about 105,000 shaft horsepower.

The authors acknowledge the help received from those who have supplied data, information and suggestions, particularly to Theodore E. Ferris, F. P. Palen, Carl E. Petersen, to various shipbuilders and diesel engine builders, the General Electric Co., the Westinghouse Electric & Mfg. Co. and Babcock & Wilcox Co.

Hoisting Vessel for Quartermasters Corp, U. S. Army



CONSTRUCTED for the war department by the Hampton Roads Shipbuilding Co. This vessel is 64 feet long overall, 18 feet beam, draft loaded, 6 feet, and is powered with a 225 brake horsepower Fulton-diesel engine.

This boat was designed for work of the war department in lifting weights from the water or from piers, such as salvaging fallen airplanes, lifting cargo and making up the joints of submarine electric cables.

The under water body is of the V-bottom type designed to facilitate welding. Longitudinal system of framing was used in construction, also to facilitate the use of welding. Three electric motors of 110-volt, direct current type are installed for operating the cargo hoist.

Free Books for Men Who Go to Sea

American Ships Supplied With Books—Technical and General—Of Benefit to Personnel and Owners—An Aid in Fitness for Duty

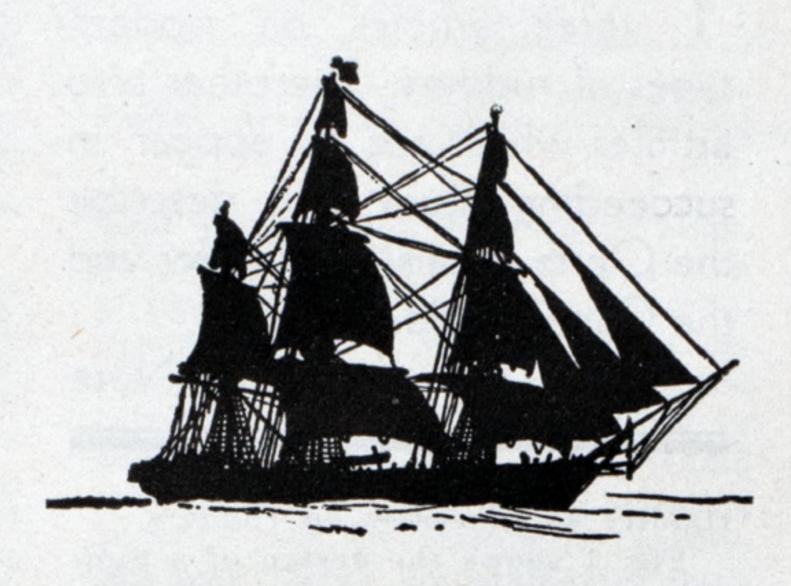
ITHOUT ships and the men who, since the earliest dawn of history, have sailed them over the oceans of the world, the civilization of today would be utterly impossible. Whatever the urge which through the ages have sent men down to the sea in ships, it has been and continues to be one of the greatest forces in the progress of man. Hence, it follows that every effort by governments, organizations or individuals which tends to support and improve the conditions surrounding our merchant marine should be encouraged. Our government in recent years has done much to make it possible to keep the American flag on the high seas. All honor to our legislators and to the Chief Executives responsible for this progressive and forward looking view in regard to the merchant marine.

In any merchant marine, however, the personnel is the first and most important factor. It was the spirit of American seamen and officers that contributed so much to the prestige of the American flag all over the world in the clipper ship era. The qualities that naturally come to mind are, initiative, daring, physical endurance and intelligence. In this mechanical age, native intelligence is no less needed than in the old sailing days, but today it is essential that such intelligence be trained and supported by an acquaintance with many mechanical features. The engineer of today had no counterpart in the older days and even the deck officer on a modern steamship must have a fund of information unknown to his predecessor in sail.

Should Receive General Support

Every agency, therefore, which makes it possible for seamen and officers to add to their fund of knowledge about their duties and the operation of their ship is doing a work which should be commended and supported in every way possible. Such a work is being done by the American Merchant Marine Library association under the leadership of Mrs. Henry Howard, as president. This organization is supported in its activities by voluntary contributions. The United States shipping board, the Lake Carriers' association and over 115 of the leading private shipping companies are among the contributors as well as approximately 3500 seamen and 1800 public spirited citizens. It is now in its tenth year. In the first year over 48,000 books were placed in circulation and last year this figure

had grown to over 340,000. The sole object of the association is to supply men of the American merchant marine with good reading matter. Books and magazines are the



Handbook for Shore Leave

men about more than 370 ports of the world is contained in the recently published fourth edition of The Seamen's Handbook for Shore Leave. Compiled under the direction of Mrs. Henry Howard, president of the American Merchant Marine Library association, this latest edition has been revised and corrected in co-operation with the state department and its consular service throughout the world.

A seaman going ashore in any one of the ports listed will have, by referring to the handbook, information on hotels, seamen's homes, banks, agencies, unions, hospitals, clinics for treatment of sickness, libraries, amusements and points of interest. A statement on the regulations of the United States public health service is also included.

The new edition, in addition to carrying the most complete list of hospitals and clinics throughout the world available in any publication also contains an up to date list of ships carrying physicians, their regular routes and call numbers. By referring to the handbook, any ship in case of illness among its personnel can radio for medical advice either from one of the ships listed as carrying doctors or through the medium of the coastal stations of the Radiomarine Corporation of America and the Tropical Radio Telegraph Co. This service is handled free, a contribution by the companies mentioned to the greater safety of seamen of all nations.

This book substitutes facts for ignorance and the seaman who is guided by it will profit not alone by avoiding those who prey on sailors ashore, but his interest in the places he visits will be greatly increased.

Over 10,000 copies of the third edition have been distributed and now this fourth and improved edition is ready. Copies will be sent to any part of the world postpaid at a cost of fifty cents each, by addressing the American Merchant Marine Library association, 67 Wall street, New York city.

material with which it works. It has become a great traveling library which circles the globe in American ships and it has been dubbed "the public library of the high seas."

Thousands of books are collected, mainly by gifts from the public. Book drives are carried on in various parts of the country under the leadership of committees made up of men and women who are outstanding in their communities. The books so collected are classified and made up into individual libraries of about 70 books each packed in seagoing chests. These chests are made up at 12 widely separated dispatch offices situated in Baltimore, Boston, Galveston, Mobile, New Orleans, New York, Philadelphia, Providence, San Francisco, Sault Ste. Marie, Seattle and Tampa. Each chest is numbered and this number together with the initials of the office from which it is shipped is stenciled inside the cover. Each morning the dispatch agent has before him the list of incoming ships and he meets as many as he can. An incoming ship which radios for an exchange of libraries receives first attention. Marine superintendents often assist in securing better service for their ships by keeping the association informed regarding the movements of their vessels.

Requests for Technical Books

It is interesting to note that special requests for technical books pertaining to the business of the ship are increasing each year and the association is making every effort to fill such requests.

In this, the tenth year of its operation, it is proposed to increase the collection and circulation of books to the end that soon no merchant ship under the American flag will sail without a library, or that any isolated lighthouse or lightship be without one. It is also proposed that an endowment fund be built up so that the future of this important work may be secured.

The work of the American Merchant Marine Library association serves the American merchant marine in two important ways. First, it gives the officers and men on American ships an opportunity for improvement and an increase in the contentment and satisfaction of mental development through reading good books. Second, it spreads throughout the land an interest on the part of men and women in the upbuilding of an able and efficient American merchant marine.

Rudder Efficiency in Modern Design

The Simplex Rudder

By J. Livingston

described as being a streamline rudder which has the advantages of a balanced rudder and yet retains the closed type of stern frame which is common to normal types of unbalanced rudders and which possesses great strength and rigidity.

This rudder was developed by the Deutsche-Werft, one of the leading German shipyards, which incidentally was the yard that made and installed the first of each of the other leading streamline rudders namely, the Contra rudder, Oertz rudder and Flettner rudder.

Further Investigation of Rudders

After the idea of the Simplex rudder was conceived, this company spent a great deal of time on further investigation of the rudder question. The scientific department sought by experiments in the wind tunnel and model tank, the best rudder form and correct degree of balance and the most suitable construction from the practical viewpoint. Judging by the progress made and results achieved with 175 ships equipped with Simplex rudders in less than two and one-half years, a design has developed which is efficient, inexpensive and possesses unusual strength and

The author, J. Livinston, is vice president of Th. Goldschmidt Corp.

THIS is the first of a series of three articles on modern types of rudders. The other two articles which are to appear in succeeding issues will describe the Oertz streamline rudder and the Contra rudder.

Editor's Note

rigidity so necessary in rudders.

Fig. 1 shows the design of a Simplex rudder as fitted to a 11,000-ton deadweight vessel. The stern frame, proper, is built in the conventional way except that instead of the usual scarfed rudder post, of rectangular cross section, a cylindrical post is fitted, this member being bolted and keyed to flanges on the main frame.

The rudder body, which is usually of welded construction, although riveting can be used if preferred, envelopes this cylindrical post and revolves around it on two strong vertical bearings which are lined with lignum vitae. The rudder, being of the displacement type, is watertight except for the sections in way of the lignum vitae bearings where wa-

ter is admitted for lubricating purposes. What little weight there is in excess of the buoyancy contributed by the hollow rudder body, is taken up by a carrier located on the deck above.

The special streamline shape of the rudder is illustrated in the various cross sections and it will be noted that it presents an unbroken and perfectly smooth streamline body.

Torque and Steering Gear

Proportions and shape of the rudder are made so that the center of pressure is only slightly aft of the axis for all angles of helm and the rudder torque or moment required to turn the rudder, is therefore very small. This will be noted from Fig. 2, which gives the torque curves plotted from data obtained during the trials of three sister ships of 10,-000 tons deadweight, each fitted with a different type of rudder. Considering the maximum torque developed in each case, it will be noted that the plate rudder requires a steering engine of about six times the capacity of that for the Simplex rudder. Attention is also directed to the fact that the torque curve, in the case of the Simplex rudder, is almost horizontal, showing a uniform torque throughout which is due to the favorable balance.

A striking example of what the reduction in torque effected by this type of rudder means in practice, is illustrated in Fig. 3, which shows the rudder quadrant for two sister ships of 10,000 tons deadweight and 14 knots speed, the larger one for a ship having a single plate rudder and the other the Simplex rudder. The weights and particulars of two such rudder arrangements is given below.

low.	
Single Plate Rudder	
Rudder quadrant with pinion and and driving motor, tons	26.00
Leonard gear, tons	3.35
Rudder stock, tons	8.30
Total weight, tons	37.65
Total price	\$12,350
Power required, horsepower	35
Simplex Balanced Rudder	
Rudder quadrant with pinion and	
driving motor, tons	11.05
Leonard gear, tons	1.95
Rudder stock, tons	4.60
Total weight, tons	17.60
Total price	\$5,100
Power required, horsepower	4

It will be noted that the weight of the rudder stock for the Simplex rudders is considerably less than that for

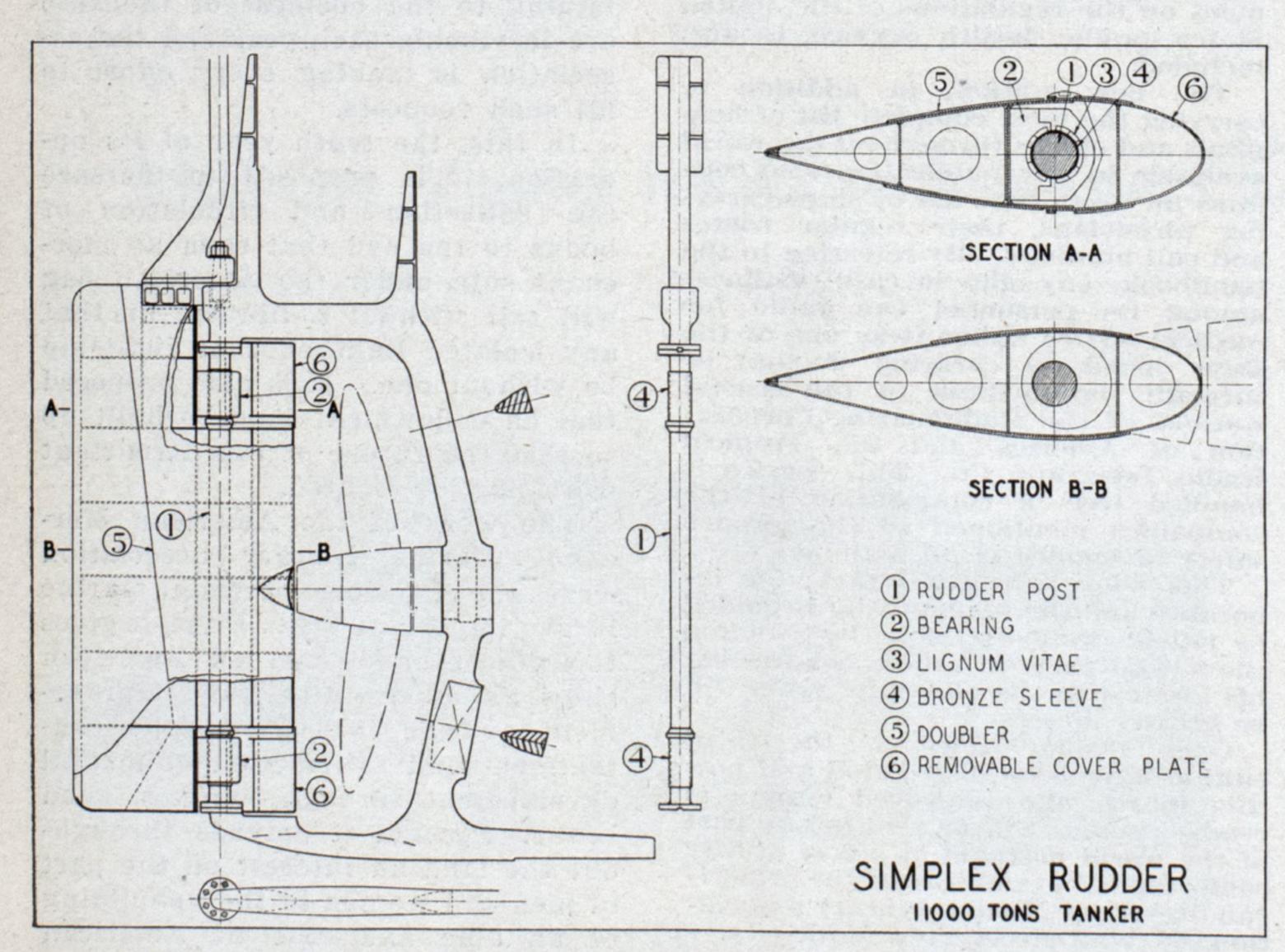


Fig. 1. Design of Simplex rudder fitted to 11,000-ton deadweight vessel

the plate rudder. The reason for this is, that due to its smaller torque the classification societies allow a reduction in the cross sectional area of the stock for this type.

The figures giving the prices of the equipment show a saving in cost of 59 per cent in favor of the Simplex rudder and as many of the larger ships of today usually carry an extra motor for emergency purposes, it will be realized that the saving in price in such cases is correspondingly higher.

In fact, the rudder torque is reduced to such an extent that a number of ships up to 4000 tons deadweight, having Simplex rudders, have been built without steering engines as the moment on the rudder stock was so small that they could be steered by hand.

However, as transmission from the bridge in such cases is not practical, a special manually operated hydraulic transmission is used. A small rotary pump is connected to the axis of the steering wheel and the pressure from the pump is transmitted to two hydraulic cylinders having a common piston. The piston rod is directly connected to a tiller which is keyed to the rudder stock. The entire system is filled with oil under pressure and the direction of motion of the steering wheel determines the direction of flow of the oil and thereby the motion of the piston in the cylinders.

Easy Steering and Maneuvering

Aside from the question of minimum torque and correct balance, another feature that had to be investigated when determining the correct form for the Simplex rudder, was the influence of the shape on the pressure differences or steering force. It was found that the factor having the greatest effect on the side pressure developed, that is, the combination of the pressure and suction on the respective sides of the rudder, is the thickness. In general, it may be said that the thicker the rudder, within certain limits of course, the greater the steering force, provided the correct shape is obtained.

The Simplex rudder employs the "Joukowsky" profile which has been found to give the greatest steering effect and at the same time offers very little resistance to the streamline flow from the propeller. Consequently, ships equipped with rudders, of this type respond with 1 to 1½ degrees angle of helm, and have the smallest turning circle. Tests made with similar ships having different types of rudders show the following relation between the turning circles.

	e Diameter ning Circle
Simplex rudder	0 "
Plate rudder	9

Fig. 4 shows the streamline action behind a Simplex rudder which has

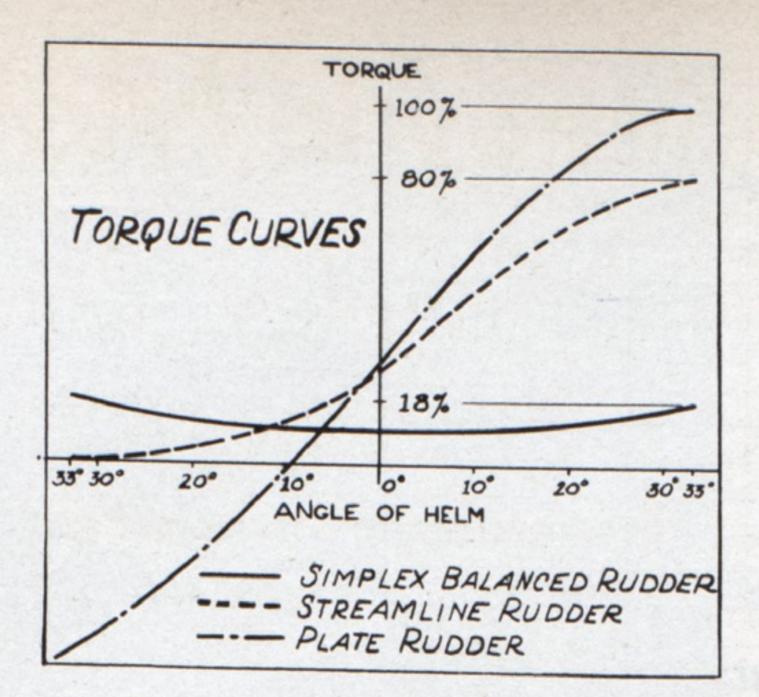


Fig. 2. Torque curves for single plate rudder, streamline rudder and Simplex rudder

been given a few degrees of helm, with the propeller stopped. Attention is directed to the strong region of depression on the starboard side despite the fact that the wheel is not turning. This strong depression or suction accounts for the splendid steering effect. It is also interesting to note that the stream is continuous and readily accommodates itself to the shape of the rudder, resulting in a minimum resistance and high propulsive efficiency. It is for the same reason, that is, the even distribution of the water around the rudder that ships equipped with these rudders have no tendency to yaw from the course but maintain a

straight path; it not being necessary to move the rudder for periods of 10 to 15 minutes at a time.

Perhaps the most noticeable advantage of this type of rudder in steering and maneuvering, as compared with the other types of rudders, is the splendid performance obtained when backing. Here because of its balanced effect, the rudder is practically 100 per cent efficient when going astern as the entire area comes into play. Also its position and shape are such in the backing condition that the water can flow readily to the propeller and the latter develops a greater thrust.

Increased Propulsive Efficiency Noted

It is now a generally accepted fact that compared with the conventional single plate rudder, streamline rudders effect a considerable improvement on the propulsive efficiency. This is due to the reduction in resistance, decrease in thrust deduction and better steering, and in the fixed guide vane type of rudder regained thrust due to the turbine blade-like shape, as well.

Fig. 5, which is taken from a model basin test, is typical of the gain in efficiency resulting from the Simplex rudder as compared with a partly streamlined rudder, that is, a plate rudder having the stock and arms sheathed over with fairing plates, the latter arrangement obvi-

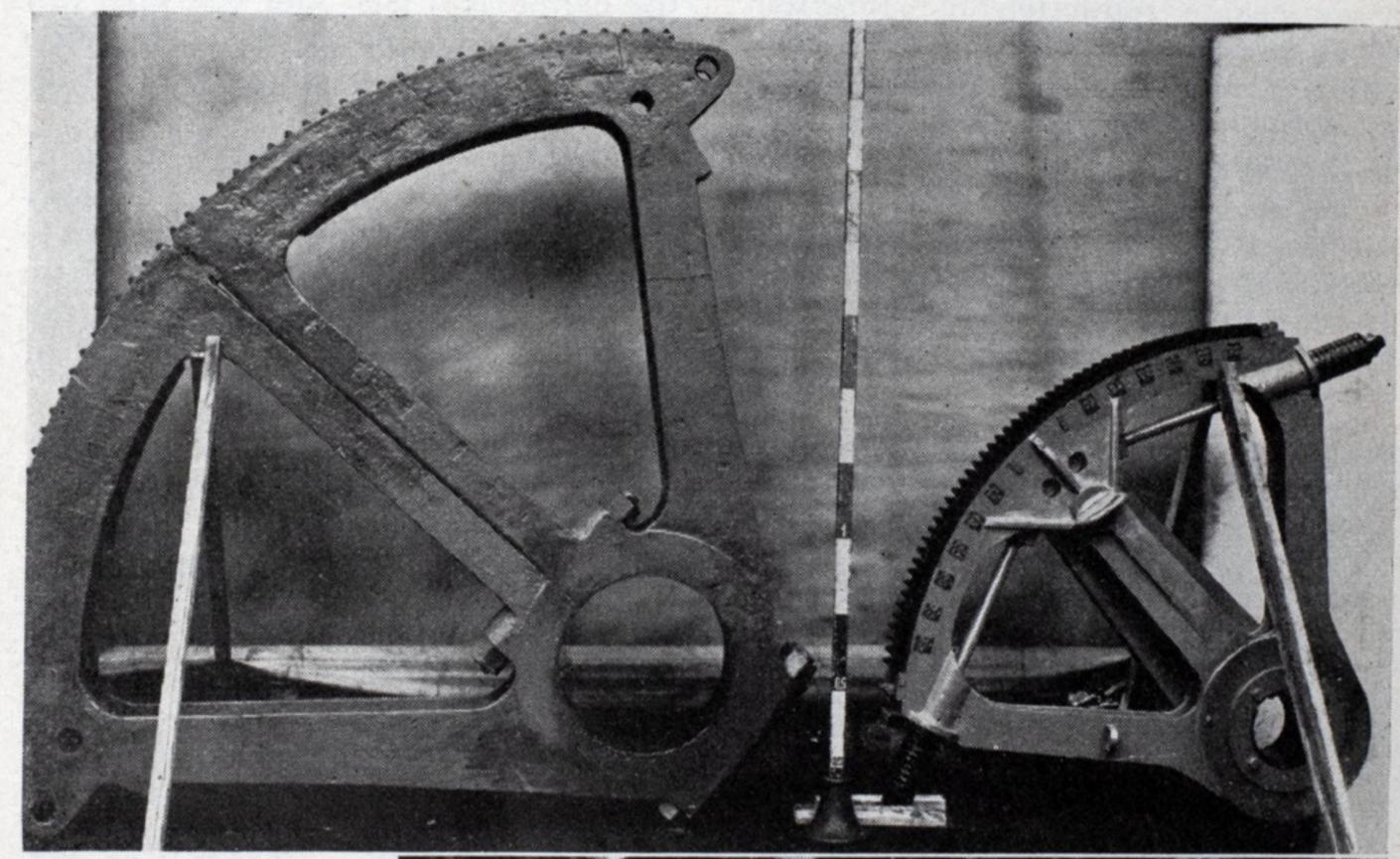
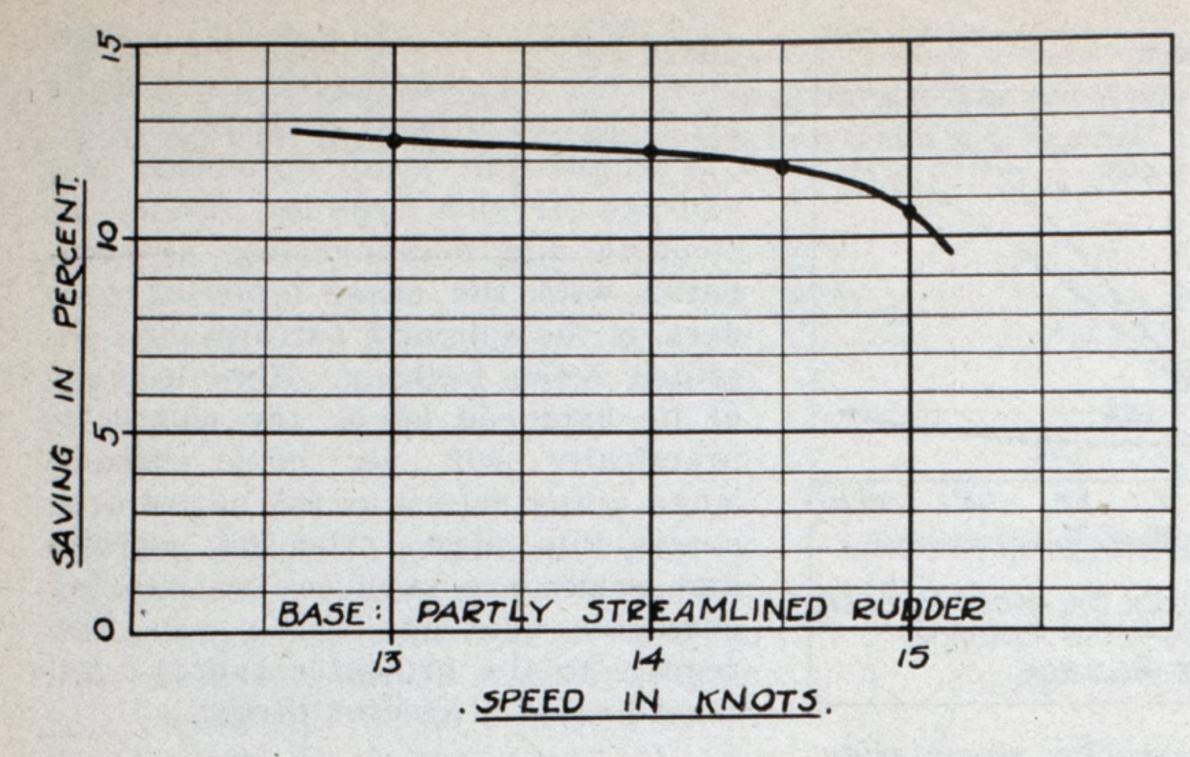


Fig. 3. Above-The remarkable difference in size of quadrant needed for single plate rudder and Simplex rudder on sisterships is clearly shown Fig. 4. At right -Streamline action behind Simplex rudder which has been given a few degrees of helm





January Designation of the Committee of

Fig. 5. Curve showing saving in per cent of shaft horsepower effected by Simplex rudder. Taken from Model basin test

ously being better than the bare single plate rudder. It will be noted that there is a saving in shaft horse-power of 12 per cent. In general, it is found that compared with the single plate rudder, the Simplex rudder will increase the speed from one-half to one knot for a given fuel consumption, or conversely, for the same speed, a saving in fuel of from 12 to 17 per cent is obtained.

Another advantage of the Simplex rudder, is the fact that it reduces vibration because of its rigid construction. Also because of its perfect streamline section, the propeller jet is received without shock and the water flows smoothly past the rudder resulting in an even propeller torque which is conducive to smooth running qualities. There is usually a noticeable reduction in vibration when backing as the flow of the propeller is very much improved and the propeller turning up evenly, the vessel becomes remarkably steady.

In the beginning of this article reference was made to the practical construction of the Simplex rudder and attention is now directed to Fig. 6, showing the Simplex rudder fit-

ted to a 9600-ton deadweight twinscrew naval tanker. As previously stated and as will be noted from the photograph, the rudder is built of plate and is welded throughout. The interior is amply subdivided by continuous vertical members and the required number of horizontal intercostal stiffeners. The structure is then solidly reinforced by a heavy doubling plate wrapped around the rudder body as shown.

By building up the rudder in this way and omitting the usual cast or forged frames the weight is greatly reduced and as a matter of fact, such a rudder is cheaper to build than the conventional single plate rudder with its thick center plate, forged stock, heavy rudder arms and many pintles. The entire rudder including the cylindrical post and bearings can be made and assembled in the shop and installed as a complete unit in very little time.

Furthermore, the rudder, being of convex shape and like a cellular tank, it is practically indestructible and its buoyancy is such that little or no weight has to be taken on the carrier or bearings. As a matter of

fact, there is so little stress put on the bearings that the lignum vitae bushings do not have to be renewed in from 5 to 7 years. It might be added in closing that

the Simplex rudder, being of the balanced type, is admirably suited for vessels of the Great Lakes where the balanced rudder has been in use for many years and where its advantages are so well recognized. Compared with the single plate and box type of balanced rudder in use there today, the Simplex rudder will not only effect an appreciable increase in speed and reduction in power but should also prove particularly advantageous because of its remarkable steering and maneuvering qualities, both when going ahead and when going astern.

Moreover, for Great Lakes service, since it is not radically different from the rudder arrangements in use there at present, the Simplex rudder, offers a very real advantage in that propeller changes and stern bearing repairs can still be made without drydocking the vessel, that is, by trimming the ship.

Perhaps one of the best known Simplex rudder installations is that on the new quadruple screw S. S. Monarch of Bermuda of Furness Withy Co., a vessel of 23,000 gross tons which has just completed successfully, a series of trials prior to entering service between New York and Bermuda. Other important companies who have adopted the Simplex rudder are the Hamburg American line, who have 22 installations, Standard Shipping Co., 16 ships equipped and the Russian government with 23 installations.

Wireless on Georgic

Marconi equipment on the new White Star line motor ship Georgic, which was launched at Belfast Nov. 17, will include both long and short wave transmitters, thus affording the ship direct wireless telegraph communication with shore at any time during her voyages, wherever they may take her. The long wave transmitter will be effective up to about 1500 miles from land, and the short wave lengths from that distance up to a world wide range.

The facilities will also extend to other ships, with which the Georgic will be able to communicate direct. Suitable receivers are fitted with these transmitters, their design being influenced by modern marine conditions. Very selective turning circuits will be introduced to eliminate unwanted signals.

The Inland Waterways Corp., which operates the Mississippi barge line, cleared approximately \$150,000 during the first seven months of the current year. It has put 321 steamboats and barges on the Mississippi and its tributaries.

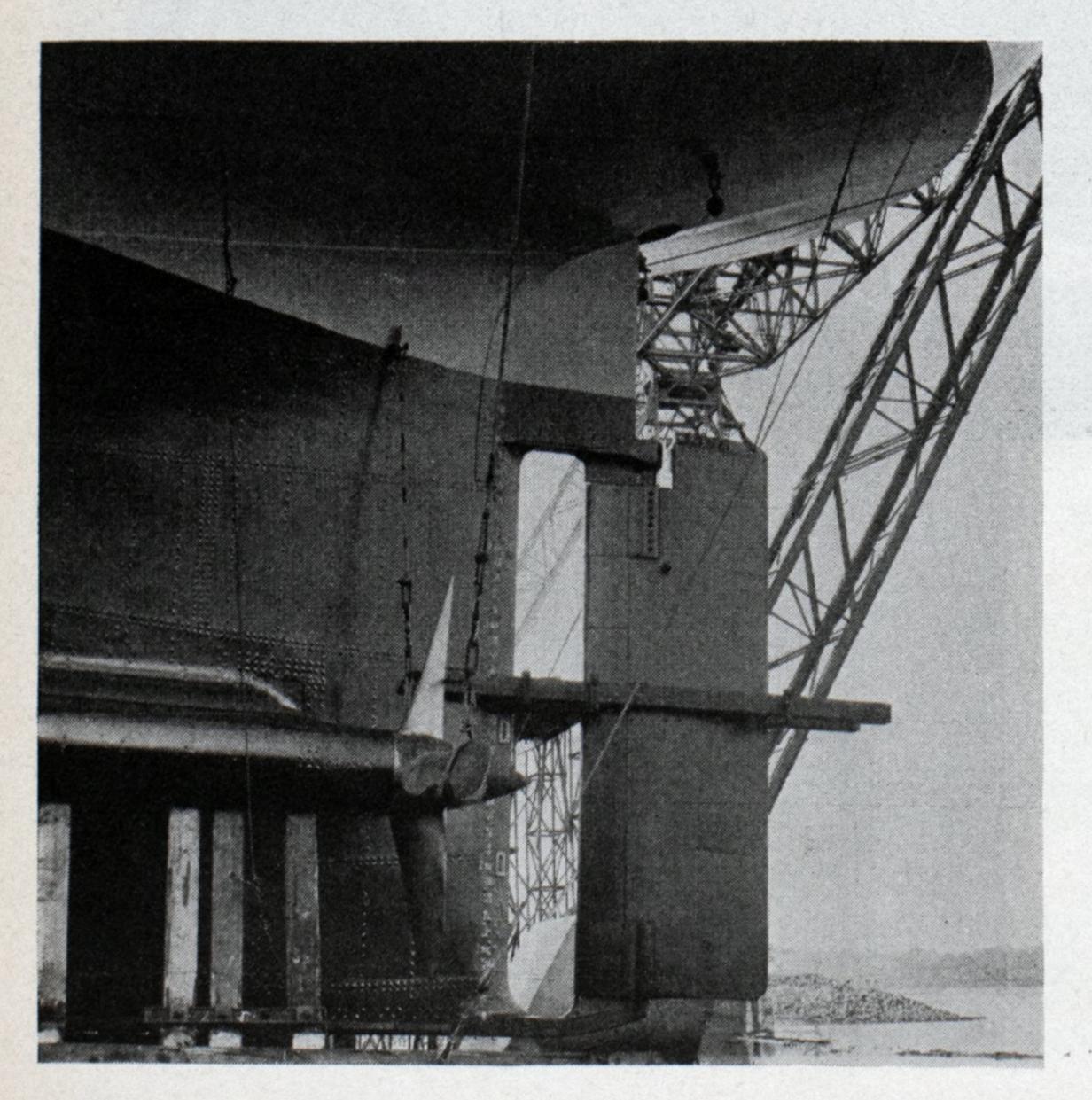


Fig. 6. Simplex rudder fitted to an 8000-ton deadweight twin screw naval tanker. The rudder is built of plate and welded. The interior is subdivided continuous vertical members and horizontal intercostal stiffeners. Heavy doubling plate wrapped around rudder body



A glimpse of the busy modern harbor of Basle on the Rhine, Switzerland

Traffic, Rhine Port of Basle, Shows Considerable Increase

A LTHOUGH 1930 was not very favorable to navigation on the Rhine in general, the traffic of the majority of ports having diminished, the terminus ports of Strasburg and Basle, on the contrary, reported a considerable increase of activity. For example, the traffic of the port of Basle shows a 78 per cent increase as compared with the preceding year.

At any rate 1930 will go down as an important date in the history of Swiss Rhine navigation. For it was in 1930 that the international convention for the regulation of the Rhine was enforced and the same year witnessed the beginning of the important transformations provided for by the above-mentioned agreement. It also was in 1930 that the port of Basle registered a new record, having attained approximately 1,100,000 tons, against 618,000 in 1929.

Owing to favorable meteorological conditions, the Rhine was open to traffic from the end of April until the middle of December. The traffic was so intense that the installations of port and railway station, although of recent construction, were often barely sufficient to meet the demand. During July, in which 182,000 tons were transshipped, there was an average of 151 tons per mile of wharf, thus constituting a coefficient of utilization which leaves far behind those of all other Rhine ports. In order to cope with the affluence of merchandise, several private companies built additional new gasoline and bitumen tanks on the Klybeck wharf. The construction of the second dock of

Klein-Huningen is to be undertaken very shortly. The tonnage of the fleet registered today for the port of Basle amounts to 87,000 tons.

The importance of river navigation to Basle has been duly recognized by all Swiss economic circles. The fact is stressed that it is thus possible to bring into Switzerland, under particularly favorable conditions, the many raw materials necessary to cover the country's industrial needs. In well informed circles, it is believed that, owing to the combined effects of the new Kembs canal and the work of regulation of the river itself, the record achieved in 1930 is the beginning of a new development of activity, which will justify the confidence in the work accomplished and the expenses connected therewith.

Equipment Company Moves

The Welin Davit & Boat Corp., Long Island City, N. Y., makers of lifeboats and Welin-MacLachlan gravity davits, recently leased a large portion of the industrial plant at 8 Lister avenue, Newark, N. J., together with 20,000 square feet of yard space fronting on the Passaic river and served by a siding of the manufacturers branch of the Central Railroad of New Jersey. The company will move to its new location about Dec. 1.

The army transport Somme, now being reconditioned for operation in the New York-Hamburg service of the United States lines, is to be renamed AMERICAN TRAVELER instead of AMERICAN EXPORTER.

United States Lines Enter Big Shipping Combine

The giant ship merger evolved through the reorganization of the United States lines brings under the American flag one of the largest steamship combinations in the world. A holding company known as the United States Lines Co. of Nevada, and formed by the Dollar-Dawson interests of San Francisco and the Roosevelt - International Mercantile Marine group of New York, on Oct. 30 signed a contract with the shipping board for reorganization.

Under the terms of the contract, a working capital of \$3,500,000 is required and the completion of the two new 30,000-ton liners now building at the yards of the New York Shipbuilding Co., Camden, N. J., is assured. The new owners also assumed \$3,170,000 of long-term obligations.

In acquiring the United States lines from Paul W. Chapman and his associates who purchased the fleet from the shipping board in February, 1929. the new company brings about the affiliation of shipping interests operating a total of 181 passenger and cargo ships aggregating approximately 1,197,227 gross tons and valued at between \$100,000,000 and \$110,000,000. Lines owned, operated or associated with the International Mercantile Marine Co. include the American Pioneer, Atlantic Transport, Panama-Pacific, Red Star, Leyland and Baltimore Mail lines. The Dollar group includes the American Mail line and the Dollar line; also the Admiral line and Pacific Steamship Co., associate companies. The Dawson interests control the States Steamship Co. and the Pacific & Atlantic Steamship Co. The United States lines fleet absorbed by the merger consists of 12 ships, the LEVIATHAN, PRESIDENT HARDING, PRESIDENT ROOSEVELT, five ships of the American Merchant lines, the Somme and CAMBRAI (army transports which were exchanged for the REPUBLIC) and the two new superliners building.

Members who represented the shipping board on the former United States lines board of directors resigned and were replaced by the following directors named by Paul W. Chapman representing the majority of the common stock outstanding: Glen H. Snider, A. M. Boal, E. G. Mc-Micken, W. L. Bunker and J. H. Robertson.

Holders of preferred stock in the former United States lines are to be given junior preferred stock, share for share, in the new organization. It is expected that P. A. S. Franklin, president of the Roosevelt-I. M. M. lines, will head the new United States Lines Co. of Nevada. Kenneth D. Dawson, president of the States Steamship Co., Portland, Oreg., has been made vice president and George Hinkins, New York representative of the Dollar lines, is secretary.

Increased Safety Assured By New Load Line

The international load line convention, signed in London in 1930 and ratified by the United States in February of this year, is one of the most outstanding developments in the history of the world's merchant services, according to United States Commissioner of Navigation A. J. Tyrer, in his annual report made public Nov. 18. It is the concensus of marine experts, the report declares, that the new load line rules will raise the standard of safety of merchant shipping in a marked degree.

Provisions of the American load line act of 1929, Commissioner Tyrer points out, made it possible for this country to promptly put into effect the chief provisions of the London international convention. For the first time in load line history, he says, it is now possible for American ships to enter foreign ports on a legal parity with other ships rather than by virtue of international courtesy. There are approximately 1500 American vessels subject to the load line law, according to the report. Up to July,

1931, 11,189 of these vessels had applied for load line and 479 load line certificates had been issued.

Load line legislation to cover vessels in coastwise traffic and on the Great Lakes was before the last congress but was not acted on. A load line law for such craft seems desirable, Commissioner Tyrer declares, for the protection of life and property. Such a law would also relieve the careful, conservative operator from the unfair competition of the small minority of owners who may be tempted to give more weight to the possible profit of the voyage than to the safety of the crew.

The amendment of present steamship inspection laws to cover motor craft is recommended in the bureau of navigation report. There are in the country today more than 12,000 documented motor vessels of which 143 are of 1000 tons or more and 250,000 American-owned undocumented motor vessels. While the report points out, it would not be feasible to extend inspection to all small motor boats, it is believed that in the interest of safety, sea-going vessels of 100 gross tons and over should be subject to inspection laws.

Government to Abandon Part of Panama Line

The Panama Railroad Steamship line, operated by the federal government, on Nov. 13 announced its intention to discontinue its service to the west coast of South America on or before Dec. 31, 1931. The company was taken over by the government about the time the Panama canal was constructed and for over ten years has operated two steamers between New York and Ecuador and Colombia. Since the Grace line is now operating in this field, the withdrawal of the Panama Railroad line is in keeping with the policy of the government to keep out of competition with American private interests. War department officials announced that the discontinuance applied only to service to the west coast of South America and does not affect that between New York and Panama.

It is likely that American shipping interests, encouraged by the government's action, will urge the entire abandonment of the Panama Railroad line.

What the British Are Doing in Shipbuilding

A N IMPROVEMENT in outlook for the British shipbuilding industry as a result of the orders recently placed strengthens the hope that the tide is turning. In recent weeks three Clyde shipyards whose building berths were empty have each received a contract and one or two fresh orders are pending. A feature of the month is that the tonnage booked has exceeded the tonnage launched.

The position on the north east coast is also improving. With the booking last week by William Gray & Co. Ltd. of another order for a vessel of 9100 tons the company have now five orders on their books. The latest order is from J. & T. Harrison of London from which firm William Gray received an order in July for a vessel of similar size. The total tonnage on the books is 45,000. Of the vessels which the firm are to build two are for the West Hartlepool Steam Navigation Co. Ltd., one for R. Ropner & Co. Ltd. and the other two for Harrison. Already work is in course of construction on the 9000 ton steamer for Ropner. The keel of the 9100 ton steamer for Harrison ordered in August has been laid in the same yard.

The position on the Tyne and Wear remains unchanged but there are prospects of William Doxford & Sons,

Sunderland receiving an order for a cargo vessel from a Greek shipping company. Swan Hunter & Wigham Richardson Ltd. have nearly completed an oil tanker which is to be launched this month. The turbo-electric ship Monarch of Bermuda ran its official sea trials on November 4.

ONE of the most important contracts secured by a British yard in the last few months is that placed by the London Midland & Scottish railway company with Harland & Wolff Ltd. who are to build a sister ship to the Clyde pleasure steamer Duchess of Montrose. This ship will be built in the firm's Govan yard.

ORDERS for two new cargo steamers have been placed with Lithgows Ltd., Port Glasgow by J. & C. Harrison Ltd., London. The vessels will each have a deadweight tonnage of about 9000 and the propelling machinery will consist of triple expansion engines.

THE balance sheet of the Fairfield Shipbuilding & Engineering Co. for the year ended June 30 shows an operating loss of £15,000. Owing to the large amount written off in previous years no depreciation has been allowed for in the year under review.

The plant throughout the works has been maintained in efficient condition. The dividend on the cumulative preference shares for the year ended June 30 has not been paid. No dividend on the ordinary shares was paid last year.

HE report of Palmers Shipbuilding & Iron Co. Ltd., Yarrow shows a loss of nearly £50,000. For the previous year the net profit was £6,596. The last dividend on the ordinary shares was 2½ per cent for 1921.

THE launching output from the Clyde last month consisted of three vessels aggregating 5846 tons compared with 18 vessels of 55,627 tons in October last year. The total tonnage launched on the Clyde so far this year is only 48 vessels aggregating 140,881 compared with 172 vessels totalling 467,070 tons during the same period last year. The output will not be much increased during the remaining months of the year so that there is now no doubt that the total launching output for 1931 will be one of the lowest on the records of the Clyde. Yarrow & Co. Ltd. Scotstoun launched the Dubrovnik for the Yugo Slav navy. This vessel, the largest and fastest flotilla leader ever built in this country has 2400 tons displacement.

Tests of Giant Gate Lifter Completed at Port Weller

HE maximum tests of the steel pontoon lock gate lifter, designed by the Wellman Engineering Co., Cleveland, and built by Collingwood Shipyards Ltd., Collingwood, Ont., for the Welland canal were conducted Oct. 30, at Port Weller, Ont. The performance of this machine under maximum conditions was extremely satisfactory for the lifter handled the largest lock gate as if it were a mere toy and it was difficult to realize that the 500-ton gate was being handled by a floating structure. This operation eclipses all past performances of floating structures in capacity. Never before was such an enormous weight lifted by a single pontoon mounted hoist capable of fine manipulation. This giant gate lifter was described in detail on pages 65 and 66 in the November, 1930, issue of MARINE RE-VIEW. Preliminary tests, conducted in May, were described in the July, 1931 issue, page 41. The accompanying views were taken during the final tests at Port Weller.

On Oct. 28, the 500-ton gate, which is 83 feet 4 inches high, was towed to the gate lifter and the shackles attached. On the morning of Oct. 30, all was in readiness and the test began. The top of the gate was lifted from the water and the pressure in the equalizing cylinders began to climb, indicating very accurately the increase in load. Water ballast pumps were started to keep the pontoon level. Frequent stops were made to make observations and measurements following which the hoist was again started. The top of the gate was lift-

ed so far out of water that the end grounded on the bottom, the depth of water being only 27 feet. The pontoon was then gradually pulled toward the gate until an upright position was reached. On account of the fact that a great deal of the weight of the gate was resting on the bottom very little power was used up to this point. As soon as the gate was vertical, however, the hoist began to assume the load and the gate was raised to its maximum height. The gate was then lowered and raised several feet with all four motors working and then four times with three of the hoisting motors only, each of the motors being cut out alternately.

After hoisting the large gate, further tests were carried out on the 25-ton auxiliary derrick and a test load of 25 tons was raised and lowered with both the boom and block hoists and also swung to 30 degrees, each side of the centerline at a 70-foot radius. The load was also handled with the boom straight out at a 95-foot radius.

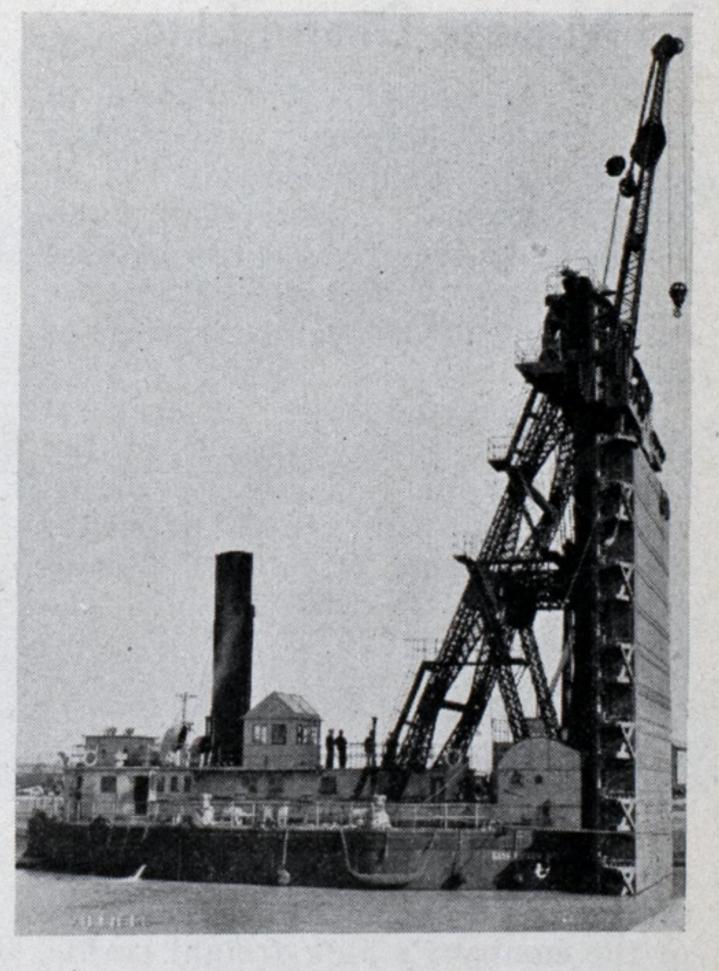
During the whole operation of lifting the 500-ton gate the pontoon was maintained on an even keel and the hoisting was so steady and gradual that no motion of the pontoon was at any time perceptible, except a very gradual increase of draft as the load was assumed. The machine was apparently as stable as if it had been on dry land and not a floating structure.

Where the operation involves lifting a leaf from the bottom of the canal the gate lifter is maneuvered to a position with its bow approximately over

the top of the leaf and with its axis approximately in the vertical plane through the axis of the leaf. When this position has been assumed the stabilizing girder is lowered until it rests on the deck. The clutches are then disconnected and the two center hoist lines paid out and made fast by the aid of divers to two center hitches at the top of the leaf. When the hitches are out of the water the outside pairs are connected and given a load equal to the others. The hoisting is then continued until the leaf is in a vertical position resting on the bottom of the canal. In this position the adjustment is made between the port and starboard hoist loads so that the set carrying the miter end of the leaf will have about 100,000 pounds more load than the other. With the entire system clutched together the hoisting can then be carried on, care being taken to keep the lifter on an even keel by shifting water ballast.

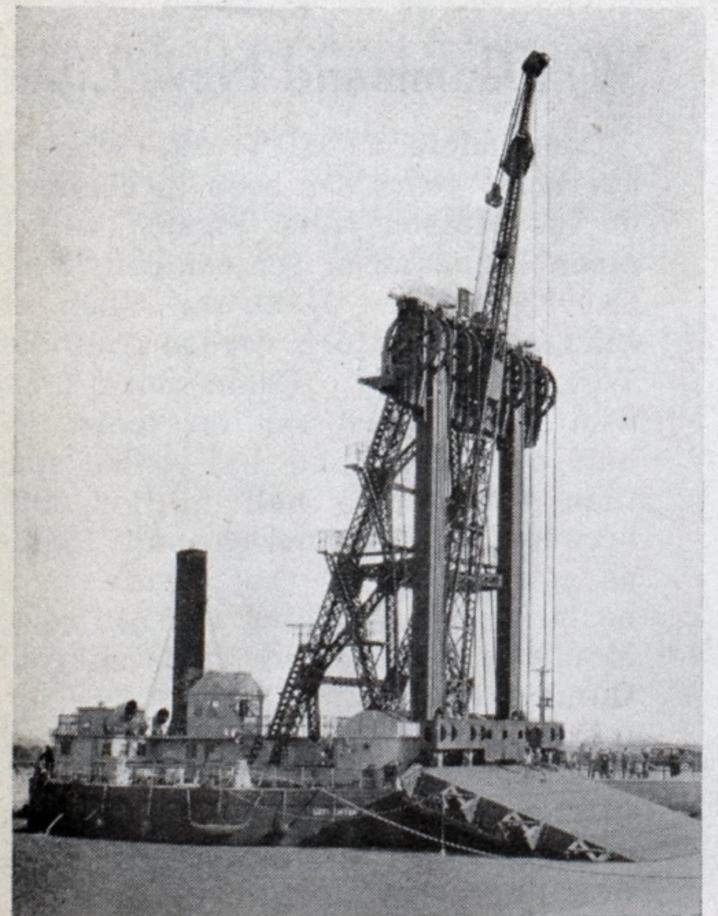
In handling any of the gate leaves and especially those 83 feet high, it is important that list does not exceed two per cent in any direction. This is taken care of by shifting water ballast either transversely or longitudinally, or both, as needed.

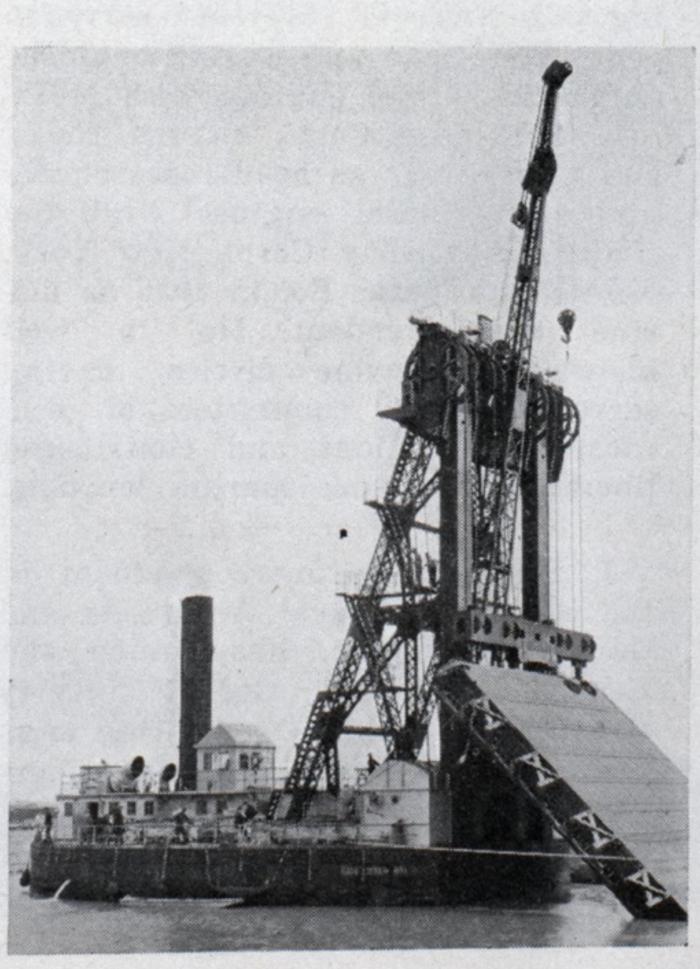
The gate lifter consists of a steel pontoon, 90 feet long, 66 feet wide and 26 feet deep. The hoisting and control mechanism is electrically equipped throughout. The power plant consists of an oil burning scotch marine boiler



Accompanying illustrations show three stages in test of giant gate lifter handling the largest gate leaf, 83 feet 6 inches high and weighing 500 tons. Lifter was designed by Wellman Engineering Co. for the Welland canal

View on extreme left shows: start of test. Center—Intermediate position. Right (above)— Finish of Lifting Test





Captain Gatewood Resigns

Captain R. D. Gatewood, for the last two years manager of the United States Salvage association, has resigned.

Captain Gatewood is well known in shipping circles and was for several years manager of the United States Shipping Board-Merchant Fleet Corp.'s bureau of maintenanace and repairs. He also served for a while as New York district director of the shipping board. His future plans have not as yet been announced.

Lloyd Director Dies

Carl Joachim Stimming, directorgeneral of the North German Lloyd, died suddenly in Hamburg on Nov. 7 of embolism resulting from injury sustained in a fall. He was 55 years old and had been connected with the company since 1917, when he was made a member of the board of directors. In 1921 he became general manager, succeeding Philip Heineken who was elected president of the board. He supervised the development of the North German Lloyd fleet after the World war, being particularly well fitted for this work owing to his early training in the German navy. His latest achievement was the conclusion of a working agreement with the Hamburg-American line in 1930.

To Manage Dimon Line

A. P. Hammond, well known in intercoastal shipping circles, has joined the Dimon Steamship Co. as general manager, succeeding John W. Chapman who resigned to become associated with the freight traffic department of the Grace and Panama Mail lines.

Mr. Hammond was for several years Pacific coast manager of the Luckenbach line and later served as vice president and general manager of the California & Eastern Steamship Co. until it was sold to the Quaker line in 1929.

Wins Promotion in Line

The appointment of F. T. Cuttle as assistant freight traffic manager of the Canada Steamship lines, in charge of the company's bulk freight traffic, was announced on Nov. 16.

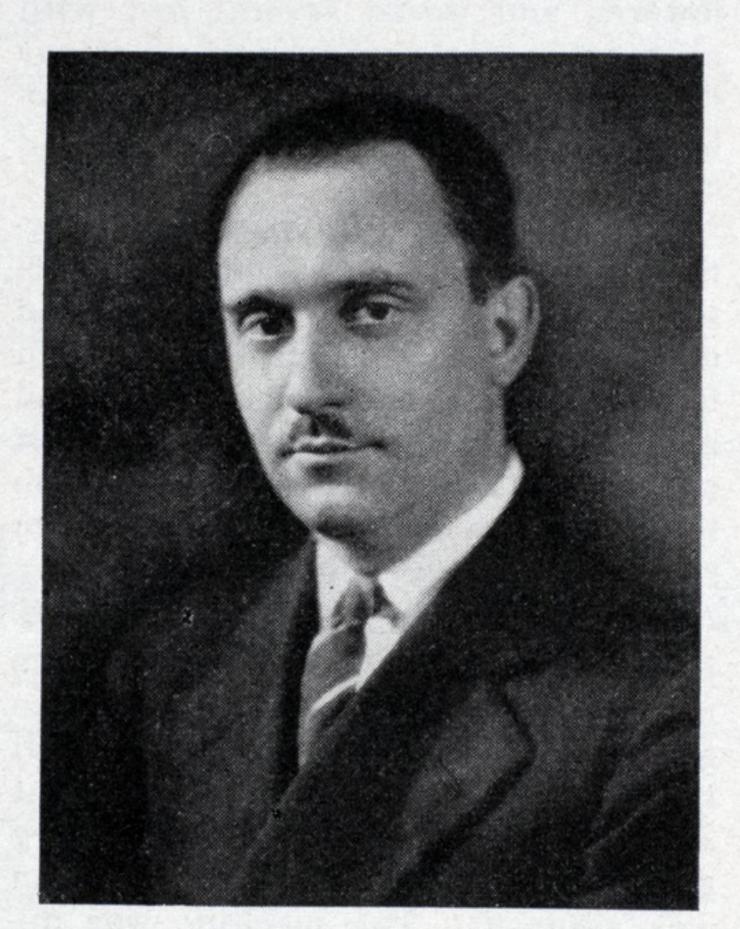
Mr. Cuttle joined the Canada Steamship lines in 1920 as assistant general claims agent and the following year was appointed general claims agent. In 1923 he was appointed manager of the insurance department and three years later became assistant to the general manager. In 1928 he joined the freight traffic department as assistant to the manager.

L. A. W. Doherty and N. W. Van Wyck were recently appointed general freight traffic manager and freighter traffic manager, respectively.

Marine Engineer Opens Office as Consultant

A RTHUR M. TODE, formerly technical consultant on marine and diesel machinery with the Texas Co., opened an office as consulting marine engineer in suite 1011, 17 Battery place, New York, on Nov. 2. In his wide technical and practical experience Mr. Tode has dealt with marine reciprocating, turbine, diesel and auxiliary machinery, modern marine management, etc.

He began his professional experience in 1913 and served four years as en-



Arthur M. Tode

gineer in the Ward, American and Clyde lines. From 1917 to 1919 he was a lieutenant in the United States navy, and from 1919 to 1923 acted as chief engineer and senior instructor in engineering aboard the training ship Newport. He then served a year as erecting and testing engineer on marine diesel engines with McIntosh & Seymour Corp., Auburn, N. Y., and also a year as head research engineer on diesel engines with the Henry L. Doherty Corp., New York, joining the Texas Co. in 1925 as marine superintendent. He is well known in marine circles, having served on many committees of technical organizations and contributed liberally to various marine journals.

J. Howland Gardner, president of the Society of Naval Architects and Marine Engineers, has joined the Kearfot Engineering Co., 117 Liberty street, New York, as consulting engineer. Mr. Gardner was for many years president of the New England Steamship Co. and graduated from the Massachusetts Institute of Technology in 1894.

Joins Grace Steamship Line

John W. Chapman, who recently resigned as vice president and general manager of the Dimon line, was appointed vice president of the Grace line, effective Nov. 5. He will supervise the cargo operations of the fleet beween New York, Central America and the West Coast of the United States. Much of his attention will be centered on the four new 19-knot combination liners being built at a cost of \$18,000,000 by the Federal Shipbuilding & Dry Dock Co. at Kearny.

To Direct Manufacturing

A. W. Thompson, who for the past five years has been Pacific coast manager in charge of sales for Fairbanks, Morse & Co., has been appointed vice president in charge of manufacturing.

Mr. Thompson joined Fairbanks-Morse in 1920 as general manager of the Indianapolis plant and in 1926 was transferred to San Francisco as Pacific coast manager in charge of sales. In 1928 he was made a vice president. Prior to his joining the Fairbanks-Morse company, Mr. Thompson spent 10 years with the General Electric Co.

Joins Westinghouse Staff

Ralph Leavenworth has been appointed general advertising manager of the Westinghouse Electric & Mfg. Co., in charge of all advertising and publicity activities of the company, including the advertising division of the merchandisng department, now centered in Mansfield, O. His office will be in the East Pittsburgh headquarters of the company. Mr. Leavenworth was formerly assistant general sales manager of the Austin Co., Cleveland, and prior to that was connected with Paul Teas Inc.

Will Command New Liners

Commodore J. H. Trask, who for nearly 30 years has been in command of the Matson liner Sierra, will be given command of the company's new \$8,000,000 liner Mariposa when she sails on her maiden voyage from New York on Jan. 16. Commodore Trask, who has been at sea for more than half a century and has sailed more than two and a half million miles between San Francisco and Sydney as commander of the Sierra, is supervising the finishing touches of the Mariposa at the Fore river shipyard, Quincy, Mass.

Captain W. R. Meyer, hero of the Tahiti rescue in 1930 and for years master of the Ventura, will be given command of the company's second new liner, the Monterey.

New Tanker Pan Bolivar Shows Good Economy and Speed

HE new oil tanker PAN BOLIVAR, recently delivered to the Pan American Petroleum & Transportation Co., has shown remarkably good economy and speed on her first three trips, making 11.3 knots in ballast on 168 barrels of oil per day, and 11.2 knots loaded on 180 barrels per day, with two boilers. Using three boilers, a speed of over 13 knots has been maintained easily. This is to be compared with around 200 barrels per day for the ordinary 10,000 ton tanker making only 101/2 knots. This vessel, built to Lloyd's highest class, by Swan, Hunter & Wigham Richardson, has the following principal dimensions:

Length, feet, inches	483	0
Breadth molded, feet, inches	65	3
Depth molded, feet, inches	36	9
Capacity, tons on 27 ft. 3 in.		
draft	14,0	00

Under the new United States freeboard law, 15,100 tons would be permitted at 28 feet 8¼ inches draft.

The power plant, which is placed in the stern, consists of a triple expansion engine, having cylinders of 271/2 x 45½ x 76 inches diameter, with 51 inches stroke, operating in conjunction with a Bauer-Wach exhaust turbine, the PAN BOLIVAR being the first new tanker to be equipped with this combined system of propulsion. There are three boilers of the single-ended, multitubular type, with the Wallsendsystem. Howden patent pressure Steam is generated at 220-pound gage and superheated to 50 degrees Fahr. The auxiliaries are steam operated and exhaust to a single feed water heater. The combined machinery was designed to develop the equivalent of 3600 indicated horsepower on full power sea trial, which would give a speed of 111/2 knots at 73 revolutions per minute, with the vessel fully loaded.

This vessel, which was ordered late in 1930, ran her trials very successfully on July 8, 1931, sailing for New York the following day and entering upon her regular duty of carrying oil

from Aruba, Dutch West Indies, to New York, on July 29.

Her average performance on the first three voyages from New York to Aruba, in ballast, and return fully loaded, between July 29 and Sept. 13, as taken from her log sheets, was as follows:

		Loaded
Distance, nautical miles	1735	1735
Speed, knots	12.35	12.12
Fuel consumed barrels		
per day	185	210
Average revolutions		
per minute	72.5	73.5
Knots per barrel	1.6	1.38

On the second loaded voyage from Aruba to New York, extending from Aug. 23 to Aug. 28, 3850 indicated horsepower was developed, which gives an admiralty coefficient of 376 and a fuel coefficient of 43,100. These figures, which include steam for heating cargo and all other purposes, were obtained with oil having a calorific value of 18,175 B.t.u. per pound.

The ship has the longitudinal system of framing, with the pump room amidships, providing a range of ten main holds, each of which is subdivided by a center line bulkhead, with summer tanks in the 'tween deck

spaces. The crew are berthed in the poop, and the engineers in the deckhouse aft. On the bridge, which is just forward of amidships, there are comfortable accommodations for the captain and officers, and several elegantly furnished spare staterooms for about ten passengers.

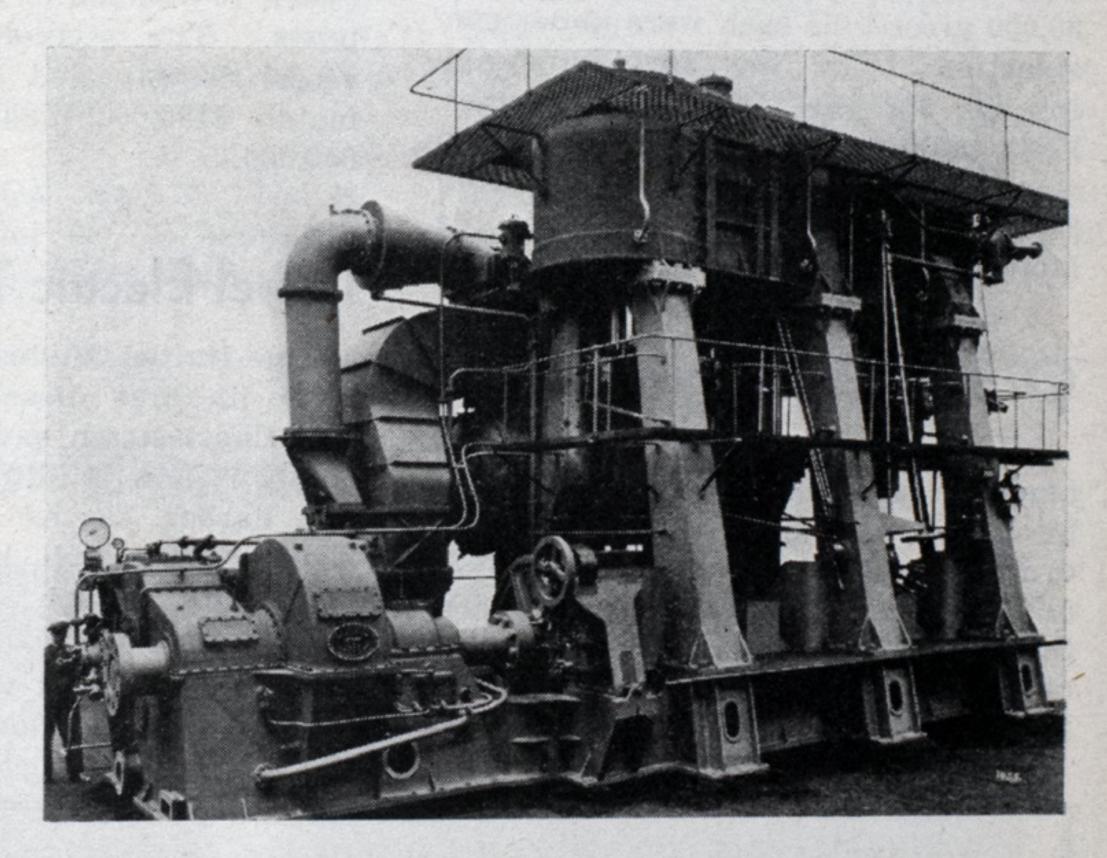
The vessel has plenty of reserve power and can be operated either with the reciprocating engine or with the turbine alone, having in that respect the advantages of a twin screw vessel.

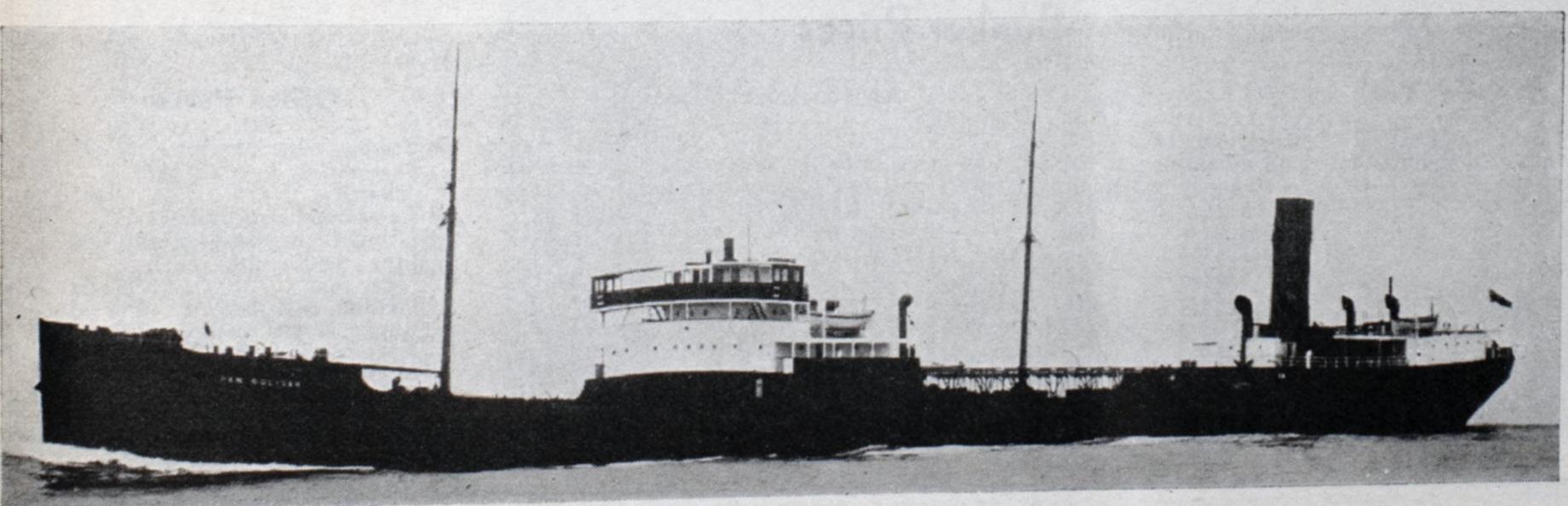
Begin Work on New Piers

Work is about to begin on the three 1100-foot piers which the City of New York will build in the North river between Forty-eighth and Fifty-second streets, and will continue for 330 days for nearly one year on a 24-hour schedule of three shifts. John McKenzie, commissioner of docks, announced on Oct. 29 that a low bid of \$4,990,000 had been received from Allen N. Spooner & Son for the construction, nearly \$3,000,000 less than the city's official estimates. Sixteen bids were submitted, the highest of which was \$6,344,000.

The piers will be large enough to accommodate the largest liners afloat. Special dispensation to extend the pierhead and bulkhead lines 75 feet into the river was granted by the War department in January. In June, Secretary of War Patrick J. Hurley turned the first spadeful of earth for the preliminary work.

Propelling unit of the S. S. Pan Bolivar consisting of a triple expansion steam engine and Bauer-Wach exhaust turbine. This vessel is the first new tanker to be equipped with this combined system of propulsion. The combined machinery was designed to develop 3600 indicated horsepower giving a speed of 111/2 knots at 73 revolutions per minute, vessel fully loaded





S. S. Pan Bolivar of the American Petroleum & Transportation Co. shows good economy fitted with Bauer-Wach exhaust turbine

Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let—Shipping Board Loans Made, Authorized or Pending

Nov. 6, by the American Bureau of Shipping, the principal shippards of the United States on Nov. 1, were building 93 vessels totaling 303,445 gross tons. Of this number, 23 of 258,100 gross tons were building for private operators.

Six combination passenger and cargo liners were under construction at the Fore River plant of the Bethlehem Shipbuilding Corp. Three of these are building for the Matson Navigation Co. and are each of 18,500 gross tons. This yard also had under construction three vessels of 7000 gross tons each for the United Mail line. The Federal Shipbuilding & Dry Dock Co. was building four passenger and cargo vessels of 10,000 gross tons each for the Grace line. Seven vessels were under construction at the Newport News Shipbuilding & Dry Dock Co. These consist of three ships of 7000 gross tons each for the United mail line; two of 5000 gross tons each for the Eastern Steamship lines; and two of 5500 gross tons each for the Colombian Steamship Co. Two vessels of 30,000 gross tons each were under construction at the New York Shipbuilding Co. for the United States lines. Four tankers of 9000 gross tons each were under construction at the Sun Shipbuilding & Dry Dock Co. for the Motor Tankship Corp.

Oceanographic Vessel

Plans for a floating seagoing oceanographic laboratory equipped with the
latest scientific instruments are being
drawn by Naval Architects Rowlands
and Strickland, 4427 White-HenryStuart Bldg., Seattle. The unique
cruiser will be named CATALYST and
will have the following dimensions:

Length, 75 feet beam 19 feet. A 140-horsepower diesel engine will power the vessel, the make not yet determined. There will be accommodations for 12 scientists and a crew of four. Bids will be invited in the near future. She will be used by the University of Washington's department of oceanography to which the Rockefeller Foundation contributed \$200,000 for an oceanography laboratory, now approaching completion here, of which \$50,000 is to be used to construct and equip the ocean going cruiser.

Conversion Contract

Plans and specifications are being completed for increasing the passenger accommodations of 11 American Scantic line vessels from 16 to 65 passengers. It is expected that the plans will be completed early in December and that bids will be taken shortly thereafter.

All of the ships are of the Hog island type, regularly employed in general passenger and cargo service between Philadelphia, Boston and Baltic ports. The reconditioning of each vessel is expected to cost approximately \$150,000, making a total of \$1,-650,000.

Diesel Electric Tugboat

The United States navy will soon have its first diesel-electric tugboat. The Charlestown navy yard at Boston, Mass., is now building a 100-foot craft for harbor service on the Atlantic coast, which will be equipped with this type of drive. It is expected to go in operation early next summer.

The power plant will consist of two McIntosh & Seymour 400-horsepower diesel engines driving two 260-kilowatt, 250-volt, 300-revolutions per minute electric generators for propulsion, and driving two 35-kilowatt, 125-volt, 300-revolutions per minute electric generators for auxiliary power. The single propeller will be driven by a 640-horsepower, 500-volt, 125-revolutions per minute double-unit motor. The electric propulsion equipment will be built by the General Electric Co.

Control will be the variable-voltage type.

Prepare Ferry Plans

W. F. Gildner, engineer, has been commissioned by the county commissioners to prepare plans and specifications for a ferryboat to replace the one now operating on the lower Columbia river between Burlington and Sauvies Island. Bids will not be invited until early 1932. While it has not yet been decided it is understood that the hull will be of wood and diesel power will be specified.

Mail Contract Awarded

Contract for carrying mails between New Orleans and Havana was awarded Oct. 31, by the postoffice department to Seatrain Lines Inc. The contract is for a period of ten years and requires the operation of Class 5 vessels of not less than 6500 gross tons and capable of carrying not less than 90 railroad cars. In addition, the operator must build two new cargo vessels of Class 5 capable of not less than 14 knots. These vessels will cost approximately \$1,236,000 each.

It is estimated that this mail contract will pay approximately \$216,720 per year.

Bunker Prices At New York At Philadelphia Other Ports 35. A. Poff to Coal Fuel oil Diesel engine Coal Fuel oil Diesel engine Boston, coal, per ton.. \$7.25 alongside oil alongside alongside trim in bunk alongside oil alongside Boston, oil, f. a. s., per Anticological Company per ton per barrel per gallon per ton per barrel per gallon barrel..... 0.75 ·Nov. 18, 1931.4.50@5.00 3.25 .65 Nov. 18, 1931.4.50@5.00 .75 3.45 Hampton Roads, coal, per Oct. 18.....4.75@5.00 .65 3.25 Oct. 18.....4.75@5.00 .75 .75 .75 3.45 ton, f.o.b., piers \$4.35 to 4.50 .75 Sept. 18, 4.75@5.00 3.471/2 Sept. 18,....4.75@5.00 3.45 June 9-Cardiff, coal, Aug. 18.....4.75@5.00 .75 3.471/2 Aug. 18.....4.75@5.00 3.45 per ton.... 13s 6d July 18.....4.75@5.00 . 85 3.721/2 July 18.....4.75@5.00 June 18.....4.85@5.25 3.70 London, coal, per ton...—s -d .90 June 18.....4.85@5.25 3.841/2 .90 3.80 Antwerp, coal, per ton. 18s 9d May 18.....4.85@5.25 1.00 May 18.....4.85@5.25 April 18.....4.85@5.25 Mar. 18.....4.85@5.25 4.08 1.00 4.4 Antwerp, Fuel oil, per ton. 67s 6d April 18.....4.85@5.25 1.10 4.32 1.00 4.60 Antwerp, Diesel oil, per Mar. 18.....4.85@5.25 Feb. 18.....4.85@5.25 1.10 4.551/2 1.00 4.88 1.10 4.551/2 Feb. 18.....4.85@5.25 1.00 4.88 British ports, Fuel oil...67s 6d Jan. 18.....4.85@5.25 1.10 4.551/2 Jan. 18.....4.85@5.25 .85 4.88 British ports, Diesel oil. 82s 6d

Remodel Sound Ferry

By contracting for a 2200 horse-power Busch-Sulzer engine, the Puget Sound Navigation Co., Seattle, will have the heaviest power diesel rig of any operator on Puget Sound. The engine is to be installed in the steel steamer Chippewa which is to be extensively remodeled, work to be begun early in 1932 and completed in March.

For 25 years the Chippewa has been in passenger and freight service in Puget Sound waters. She was brought from the Great Lakes through the Strait of Magellan, having been built at Toledo in 1900. The vessel's gross tonnage is 996, net 677. Dimensions are: Length 200 feet; beam, 34 feet, depth, 19.8 feet. After coming to this coast as a coal burner she was changed to fuel oil and is now to become the largest Diesel powered automobile ferry in local waters.

For remodeling to fit her for the more modern installation a contract involving \$54,000 is pending. This work includes taking out the steam rig, building new engine beds and cabin changes. A new observation room and modern cabins for women are to be constructed. When completed the vessel will have capacity for 76 automobiles and 1250 day passengers. The present speed of 13 knots will be increased to 16½. The horsepower of the present steam engines is 1870. The Chippewa is single screw.

The remodeled ferry will be used between Seattle and the Puget Sound navy yard at Bremerton, covering the distance in 50 minutes. On this run there is intense competition both by water and air and the owners of the Chippewa believe the rebuilt ferry will enable them to offer unexcelled service. The need of additional speed and the economies presented by diesel

power decided them in rebuilding a steel hull that is in excellent condition although 30 years old.

Third Vessel Launched

The 11,000-ton turbo electric liner CHIRIQUI, third of the six new vessels for the United Fruit Co., was launched Nov. 14, from the yard of the Newport News Shipbuilding & Dry Dock Co. Mrs. Regina Robson, wife of the marine superintendent of the United Fruit Co., acted as sponsor.

The Chiriqui is a sister ship of the Talamanca and Segovia, launched from the same yard Aug. 15, and described in the September issue of Marrine Review. The other three vessels of the six under construction for the United Fruit Co. are building at the Fore River plant of the Bethlehem Shipbuilding Corp.

These new vessels will have a displacement of 11,000 tons, a length of 447 feet and a beam of 60 feet. They will have a speed of 20 knots.

Cutter Contract Awarded

The Defoe Boat & Motor Works was awarded the contract for building coast guard cutter No. 55 on its low bid of \$408,800. Other bidders and bids were as follows: Maryland Dry Dock Co., \$432,339; Bath Iron Works, Corp., \$457,000; Great Lakes Engineering Works, \$508,000; Sun Shipbuilding & Dry Dock Co., \$538,000; Manitowoc Shipbuilding Co., \$549,800; United Dry Docks Inc., \$560,000; American Ship Building Co., \$670,000.

The contract calls for completion not later than Oct. 3, 1932. The particulars of Cutter No. 55 were given in the November issue, page 61.

Bid for Lighthouse Tender

Bids for the construction of a steel, twin screw lighthouse tender, for service in the waters of the Gulf of Mexico, were opened Nov. 24 by the lighthouse service of the department of commerce. This vessel is to be 93 feet long, of 23-foot beam, and will draw about five feet of water. It will be propelled by two diesel engines of about 55 shaft horsepower each.

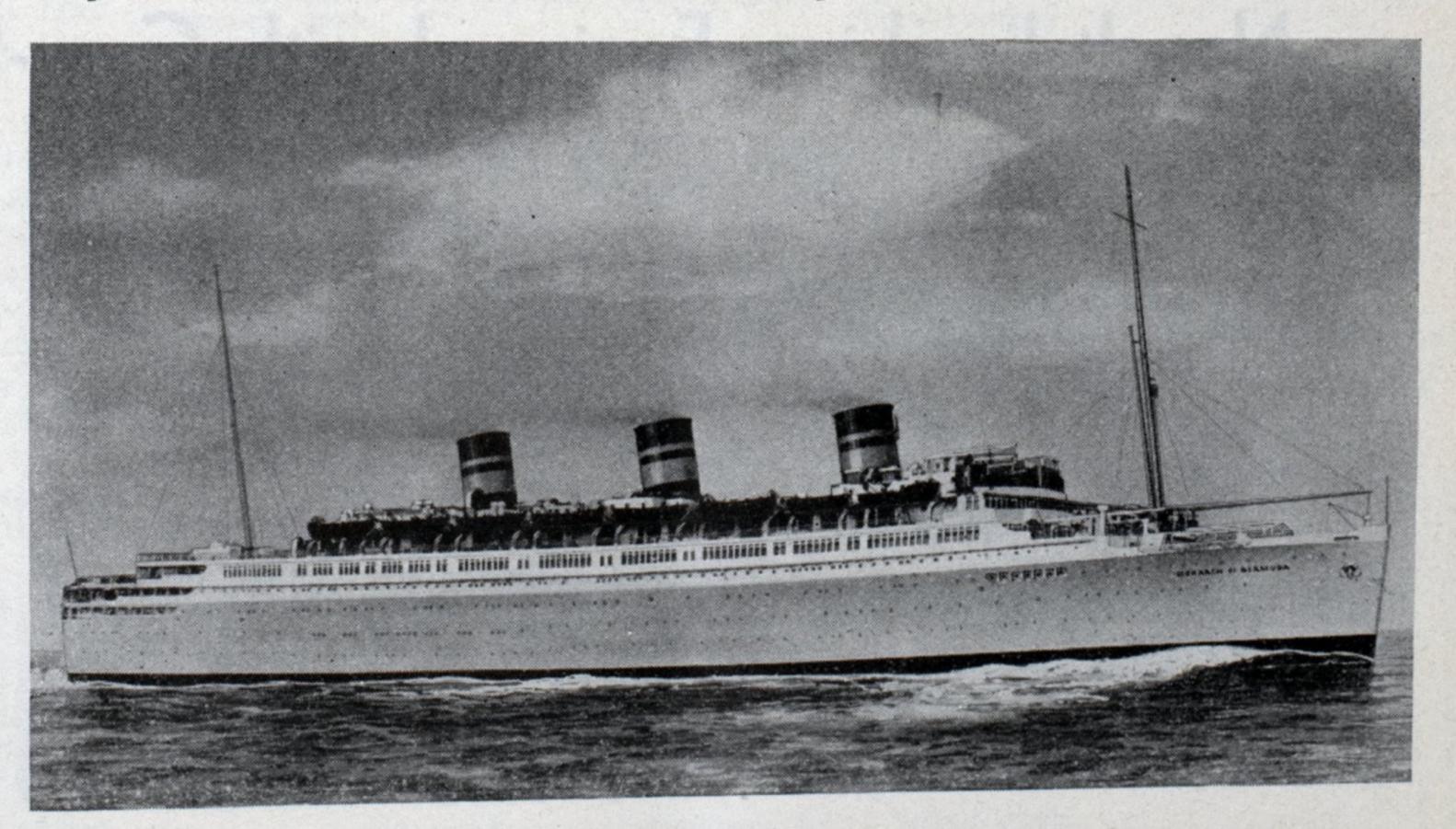
The MYRTLE, as this new vessel is to be called, has been designer for buoy and beacon work in the inside waters of the eighth lighthouse district, which extends from the Suwannee river in Florida to the Texas-Mex ican border. In order that it may build beacons and tend other aids to navigation placed along the edges of comparatively shallow channels, the MYRTLE will be of light draft. The principal exterior feature distinguishing her from commercial vessels will be the substantial mast and boom, rigged for the lifting of buoys, piling, and similar heavy objects.

The duties of the MYRTLE, when completed, will be the building and maintenance of beacons, and the placing and care of buoys and similar aids to navigation in the inside waters bordering the Gulf of Mexico. Much of this work will be in the intracoastal canals and other improved waterways used by smaller vessels, both commercial and pleasure craft. It is expected that the MYRTLE will be placed in commission before the end of the year 1932.

Two dredges operated by the Arundel Corp., Baltimore, recently were equipped with Goodrich cutless bearings, manufactured by the B. F. Goodrich Rubber Co., Akron, O.

New Liner, Monarch of Bermuda, Enters Service

MIGHTY ship is the \$8,000,000 tursuperliner boelectric MONARCH OF BERMUDA, new flagship of Furness-Bermuda line. Arrived New York Nov. 23 on her maiden voyage. Attained a speed of 21 knots during official sea trials with only seven of her eight boilers operating. The MONARCH OF BERMUDA is 580 feet long, 77 feet beam and 27,770 tons displacement, the largest vessel ever built for regular operation between New York and Bermuda. The vessel has accommodations for 834 first class passengers.



Experts Search for Cut in Shipbuilding Costs

The first meeting of the committee created recently at the suggestion of the bureau of research of the United States shipping board to aid in the reduction of American shipbuilding costs was held in the offices of the National Council of American Shipbuilders, 11 Broadway, New York, on Nov. 17. General plans were discussed for the acquisition of required data and the co-operation of shipbuilders, shipowners and the American Bureau of Shipping to develop economy in the design and operation of ships and ship machinery. The committee agreed to conduct research work and tests of materials used in ship construction. Tests will also be conducted on the latest developments in hull design in model basins. The marine engineering field is expected to make valuable contributions to the committee.

Shipbuilding costs in the United States are far higher than abroad, and while it is recognized that this nation, because of its higher standard of living, will not be able to reduce prices to meet those abroad, it is believed that considerable savings can be made, thereby reducing the burden on American shipowners building vessels in this country. Shipbuilders contend that building costs can be reduced only through simplification of design or multiplication of orders for vessels of similar types.

Because of the cost differential which exists between American and foreign shipyards, private interests have delayed building ships, particularly cargo vessels, until the government grants aid either in the form of mail contracts or one of several other methods that have been suggested.

The members of the new committee

are: J. W. Barnett, director of construction of the shipping board; Capt. O. L. Cox, bureau of engineering, Navy department; Commander H. E. Saunders, bureau of construction, Navy department; H. B. Walker, president American Steamship Owners' association; H. G. Smith, president National Council American Shipbuilders; Capt. C. A. McAllister, president American Bureau of Shipping; David Arnott, chief surveyor American Bureau of Shipping.

Fifth Ship Completes Trials

The CITY OF NEWPORT NEWS, fifth ship of the Baltimore Mail line fleet, completed her sea trials in faster time than any of the other ships which preceded her into service, according to an announcement Nov. 16 by the Baltimore offices of the new line. This ship, which follows four sister ships into the passenger, mail and fast freight service over the Baltimore, Hampton Roads, Havre, and Hamburg route, averaged nearly 18½ knots over a measured course, when taken out from the yards of the Federal Shipbuilding & Drydock Co., Kearny, N. J.

The Barrett Bindery Co., 1332 West Monroe street, Chicago, is offering free to those who ask for it, an interesting 32-page booklet on "How to Take Inventory in a Manufacturing Plant."

Plan Super Liners

It is reported that the company which recently acquired the United States lines is contemplating the construction of two superliners which will put the United States on a competitive basis with the foreign companies now operating on the North Atlantic. These two vessels will cost at least \$70,000,000.

Launch Eleventh Cruiser at Camden Shipyard

The eleventh of fifteen 10,000-ton cruisers authorized by congress under terms of the London treaty was launched at the yard of the New York Shipbuilding Co., Nov. 7. This vessel, which was chistened the Indianapolis, was sponsored by Miss Lucy Taggart, daughter of the late mayor of Indianapolis, Thomas Taggart.

The Indianapolis is 610 feet long overall, 66 feet 6 inches beam, 17 feet 5 inches mean draft and designed for a speed of 32½ knots. She will carry four observation planes, 9 eight-inch and 8 five-inch antiaircraft guns, and two torpedo tubes. She will have a crew of 553 enlisted men and 49 officers. The keel was laid March 31, 1930.

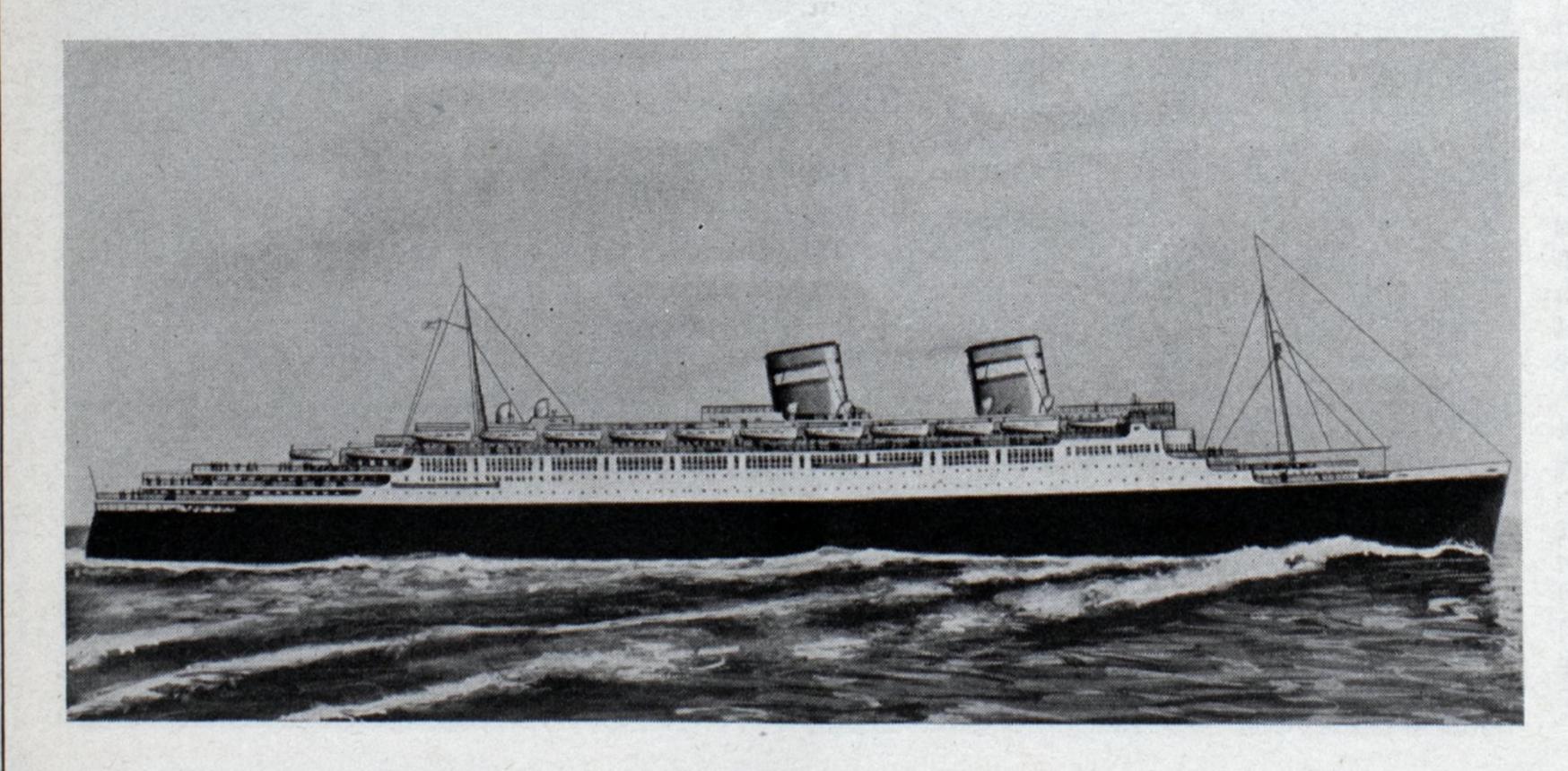
Panama Mail Ships

The first of four new vesels building for the Panama Mail line service of the Grace line will be launched from the yard of the Federal Shipbuilding Co. in February, 1932. The name of this new ship will be the Santa Rosa. The second vessel, which will be named the Santa Paula, will be launched in April. The third, the Santa Lucia, will be launched in June. The keel of the Santa Elena, the fourth vessel in this program, will be laid following the launching of the Santa Rosa.

The new Boston fireboat Matthew J. Boyle, successfully passed its builder's trials, Nov. 17. It exceeded all contract requirements regarding speed, pumping capacity and maneuverability.

This new boat is 125 feet long overall, 29 feet 6 inches beam and 10 feet 6 inches loaded draft. She is powered with oil burning steam engines.

New Italian Liner Equipped with Gyro-Stabilizer



RTIST'S conception of 48,000-ton Lloyd Sabaudo liner CONTE DI SAVOIA, launched at Trieste Oct. 28, the first passenger ship in the world equipped with gyro-stabilizer plant. The CONTE DI SAVOIA is being equipped with a three-unit system supplied by the Sperry Gyroscope Co. of sufficient power to counteract the effects of heavy weather. The ship will have an overall length of 811 feet 9 inches, beam of 95 feet 10 inches.

Use of Higher Quality Steels Seen in Shipbuilding

By W. J. Priestley*

progress has been made in the steel industry during the past few years developing higher strength steels and other noncorroding steels that are especially suitable for ship construction. It would appear that the steel manufacturers have not always passed along to the shipbuilder details of what has been developed in the steel industry, with the result that alloy steel is not being used to the same extent in the marine field as in other industries. Much of this information could be used to advantage by the naval architect.

Certain specifications must be met in steel suitable for ship construction and it is desirable that the steel be used in the "as-rolled" condition. Among these requirements, it must have characteristics that will allow it to be reheated for forming and shaping in the shipyard without destroying its original physical properties; it must not be an air-hardening steel; and it must be suitable for punching, shearing and riveting. Since welding is replacing riveted construction in many instances, the steel must be satisfactory for gas and electric welding, without local hardening or destruction of its original physical properties. In addition to these requirements, it must also have suitable strength and a high elastic limit with good ductility.

Shipbuilders are seeking to decrease the dead weight of ships by using higher strength steel for hull construction. Many types of alloy steels offer greater strength than mild carbon steel, but not all high strength steels would meet the specifications mentioned above.

However, a steel has been introduced recently that likely will meet these requirements. This is an intermediate alloy steel containing 0.40 to 0.60 per cent chromium, 1.10 to 1.40 per cent manganese, 0.70 to 0.80 per cent silicon, and carbon ranging from 0.10 to 0.40 per cent, depending upon the tensile strength desired. It is known to the industry as "cromansil" steel (Steel, Oct. 26, Page 46). It has high tensile

This is a full abstract of a discussion by W. J. Priestley, vice president of the Electro Metallurgical Sales Corp., 30 East Forty-second street, New York City, presented before the Society of Naval Architects and Marine Engineers, at the annual meeting, Nov. 20, 1931. Mr. Priestley's remarks apply particularly to Paper No. 4 by Rear Admiral Geo. H. Rock C. C. U. S. N.

strength and high elastic limit accompanied by good ductility, which permits the assumption of higher working stresses than are permissible in mild carbon steel. This allows the designer to use lighter sections and less weight for a given structure without lowering the factor of safety.

Rear Admiral George H. Rock, chief constructor, United States Navy, has outlined specifications for a high strength steel that would be of great value to the navy in lightening ship construction. These requirements are as follows:

Proportional limit (permanent set 0.0004-inch in 8 inches)—40,000 pounds per square inch minimum.

Ultimate tensile strength — 88,000 pounds per square inch minimum.
Yield point (drop of beam)—55,000

pounds per square inch minimum.

Elongation in 8 inches—15 to 20 per cent, depending upon thickness.

Cold bend test—180 degrees around pin 2½ times the thickness of material.

It will be noted from the following data that the chromium-manganese-silicon steel exceeds these requirements in every respect, including proportional limit, ultimate tensile strength, elongation and reduction of area. Tests were made on 1½ x %-inch bars, in the "as-rolled" condition, with the following results:

Proportional limit—42,100 pounds per square inch, by Huggenberger test, made with delicate extensometer; the usual laboratory procedure of stress-strain testing probably would have resulted in a higher figure.

Yield-point—56,700 pounds per square inch.

Maximum stress—91,300 pounds per square inch.

Elongation in 8 inches—23.2 per cent; in 2 inches—42.0 per cent.

Reduction of area—63.8 per cent. Shear fracture of 45 degrees. Brinell hardness—196, checked on four tests.

This steel may be furnished in the form of plates, shapes, bar stocks, and tubes. It is an open-hearth steel and requires no special process for melting other than the addition of the small amount of alloys making up its composition. Standard practice is followed in casting and rolling. It may be furnished in standard structural shapes to meet present detail methods of fabrication. Because of its good welding properties the steel affords the designer the opportunity of modifying present detail design and saving weight by doing more welding and less riveting. With a given weight of steel for construction, welding permits the steel to be placed where it will be most effective. The proper placing of chromium-manganesesilicon steel in welded construction enables the designer to save considerable weight.

The steel should be suitable for construction of boilers and pressure vessels. The A. S. M. E. boiler code committee has had considerable discussion regarding the allowable working stresses of steel plate for boiler and pressure vessels, and has resisted attempts to raise the tensile strength of ordinary carbon steels and has taken the position of preferring safety to economy or lightness. Attempts to raise the carbon content or otherwise change the chemical characteristics have been found to detract from the desirable physical qualities of plain carbon steel for boilers. Up to the present time we understand the boiler code committee has not desired to change its present safety factor of five for stationary steam boilers, based on the minimum tensile strength of the steel. It would appear that chromium-manganese-silicon steel is a satisfactory material since it offers an increase in tensile strength and higher elastic limit, without modifying other desirable physical qualities for boiler and pressure vessel construction.

Salt water corrosion is another problem in marine construction. One grade of noncorroding steel con-

(Continued on Page 43)

Physical Properties of Structural Steel

		Pounds per sq 000 om		Elongation	
Type of steel and	Carbon		Ultimate	in 2	of area
	per cent	Yield point	strength	inches*	per cent
Chromium-manganese silicon	THE RESERVE OF THE PARTY OF THE				
As-rolled or normalized	. 0.20	60	90	28	62
As-rolled or normalized		70	115	25	60
As-rolled or normalized		90	140	20	50
Silicon-manganese					
As-rolled	. 0.30	65	110	25	52
Normalized	0 0 0	70	100	28	60
Manganese, 1.50 per cent mang	ganese				
As-rolled		60	95	24	55
Normalized		60	95	28	60
Silicon, 0.40 per cent silicon				0.0	-0
As-rolled	0.30	50	90	22	50
Structural steel				0.1	1=
As-rolled	0.25	38	65	24	45
*Mass effect appr	oximatin	g 1-inch roun	d stock.		

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman

Attorney at Law

HILE a wharfinger does not guarantee the safety of the wharf or dock, and does not impliedly contract to be liable in any event for injuries through contact of vessels with obstructions there, he is required nevertheless to exercise reasonable care to prevent injury to vessels because of such obstructions of which he knew, or of which by the exercise of reasonable care he should have known. One of those implied duties devolving on the wharfinger is the making of reasonable inspection of the wharf and its approach to ascertain whether there are dangerous obstructions. If the failure to exercise such care is the proximate cause of injury to a vessel docking there, the wharfinger is liable for his omission of duty.—Slater Fireproof Storage Co. v. Nicholson Transit Co., 47 F. (2d) 734.

THE happening of an accident does not raise any presumption of negligence on the part of the tug. She is not an insurer of the safety of the tow. Moreover, the tug should be exonerated if her master acted, not with the highest degree of care and skill, for that was not required of him, but with reasonable skill and care and in the exercise of the reasonable discretion of experienced navigators.—LIZZIE D. Shaw, 47 F. (2d) 820.

HE courts have very definitely declared that there is a duty to stop and reverse as soon as danger of collision is seen to exist because of doubt as to what the other vessel may do, it was declared in the case of QUOGUE, 47 F. (2d) 873. This was a libel to recover for damages to a car float caused by collision with a float in tow of a named tug, whose fault was most glaring, according to the court. She made no attempt to excuse it, but contended merely that damages should be divided because the other tug did not stop and reverse more promptly. "It is a hard rule," observed the court, "which requires a master when he sees another vesesl about to cross his bow with wanton disregard of his rights to stop and allow the arrogant usurper to pursue wrongful course. Better safety than pride; and, however slight the hope that rules to promote safety will be observed under such circumstances, whatever courts may say, the vessels must be judged according to their legal duties." The duty of the master of the tug who saw that the other tug intended improperly to pursue a wrongful course, as a prudent navigator, was not merely to sound the alarm and slow and stop his engines, it was held, but to get the way off his vessel as promptly as possible. He was privileged to

continue on his course on the chance that the other vessel would change her announced purpose if he refused to consent. The court divided the damages.

IMITATION clauses in a bill of lading cannot be invoked where a fundamental breach, like a deviation, terminates the contract of carriage, nor do they cover a case where the cargo was not taken aboard and was lost or damaged on land. "They manifestly were only intended to cover cargo shipped," it was held in Oliver Straw Goods Corp. v. Osaka Shosen Kaisha, 47 F. (2d) 878, "and logically could have no relation to goods which were not placed on the vessel and would not have been lost if disposed of as agreed. In other words, the limitation clauses applied only to cases where the damage was due to losses encountered during the performance of the contract contained in the bill of lading and their incidence was conditioned upon shipment of the cargo."

THERE is no negligence in leaving open a cargo hatch if the ship is awaiting cargo.—Long v. Silver Line Ltd., 48 F. (2d) 15.

THE damages recoverable by a shipper for loss of insurance coverage by reason of a carrier's failure to have inspection are the same as in cases where there has been a breach of contract to insure, and, in the case of F. S. Royster Guano Co. v. W. E. Hedger Co., 48 F. (2d) 86, this was held to be the value stated in the policy less the net amount realized from a salvage of cargo. The shipper was also entitled to recover expenses incurred in good faith in an attempt to recover insurance.

A WHARFINGER, though not an insurer, is bound to exercise reasonable diligence to ascertain the condition of berths at which it invites vessels to moor. Failure to discover a hidden obstruction to navigation existing in its slip and to repair the premises or to give warning to the vessels coming there was negligence for which it was liable—Berwind White Coal Mining Co. v. City of New York, 48 F. (2d) 105.

N THE case of R. Lenahan Jr., 48 F. (2d) 110, the court, in deciding that a tug was liable for damage to barges as the result of its negligence, regardless of the fact that both tug and barges were on demise to the same company, had this to say: "A demise makes no difference in collision, and negligent towage is

equally a tort. The notion that a thing may be guilty is archaic enough, no doubt an animistic survival from remote times; but once it be granted, it does not comport with convenience or precedent to interject exceptions, based on added irrational fictions. Moreover, while the doctrine has been pressed very far, it has never (with stated exceptions) been extended to the vicarious transfer of fault to an innocent vessel; and indeed, that would contradict even the atavistic conceptions on which the whole theory depends."

A CLAUSE in a bill of lading, requiring notice of a claim for short delivery before removal of goods discharged from the vessel, though valid, must give the shipper a reasonable opportunity to make a claim. Such a clause did not require a claim until the carrier abandoned search for the missing goods. The phrase "discharged from the vessel," as used in such bill of lading, meant delivery to the shipper.—E. Girli & Co. Ltd., v. Cunard Steamship Co. Ltd., 48 F. (2d) 115.

WORKMEN'S compensation act of New Jersey does not apply to death of maritime employes occurring on navigable waters.—Linseed King, 48 F. (2d) 311.

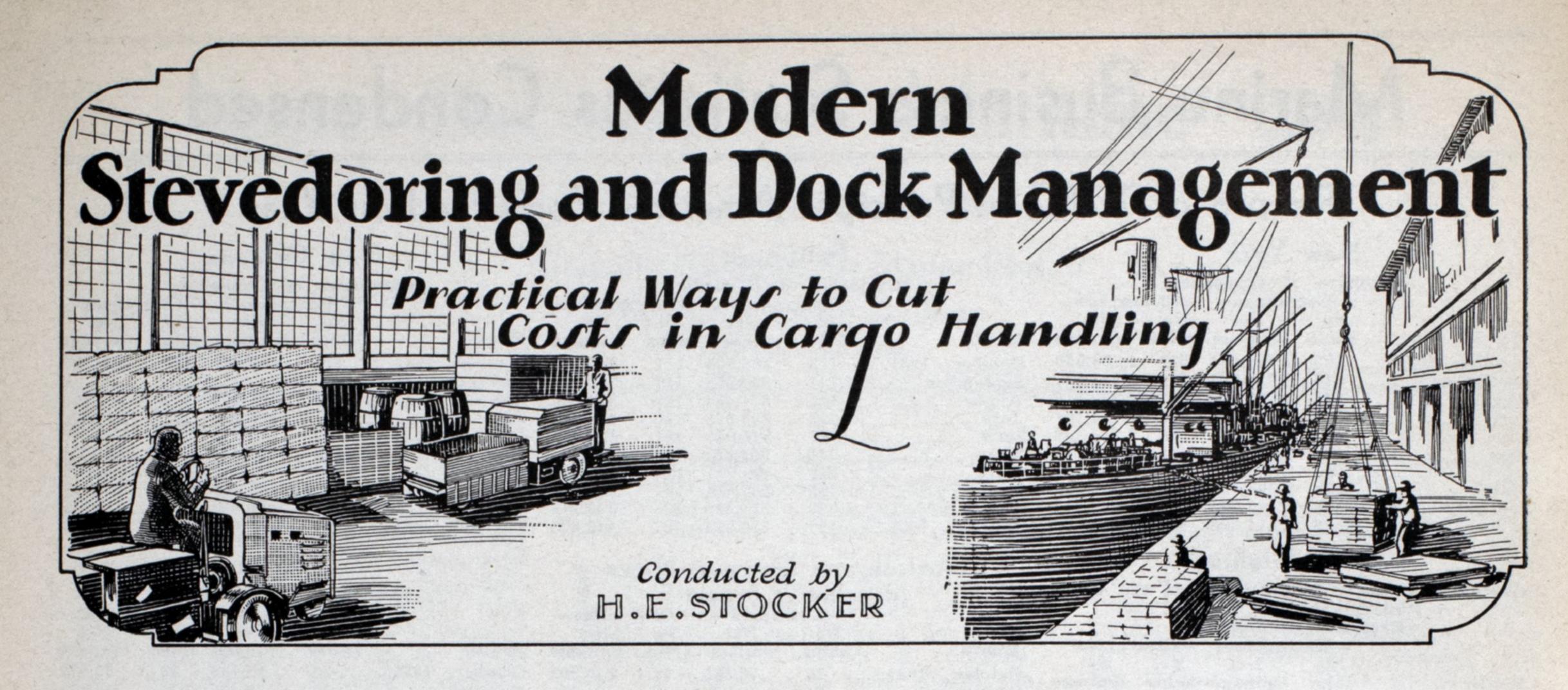
NE who signs shipping articles is a seaman and member of the crew regardless of the rating to which he is assigned. A "workaway," defined as an extra man employed on a vessel as an accommodation to himself, who was assigned to duty as assistant steward, though paid a salary of only 30 cents per month, was not entitled to be considered as a passenger in determining right to a salvage award, it was said in the case of Tashmoo, 48 F. (2d) 366. Salvage award for services in connecting wireless apparatus to signal distress was denied such assistant steward, the court holding that claims of seamen for salvage services rendered to their vessels during the voyage cannot be allowed.

WHERE no delivery date is provided in a charter, the most that can be required of the owner of a ship, is to tender with reasonable dispatch. In case of a late delivery, the charterer can accept the ship and sue for damages caused by the late delivery, but he can also waive delay by not objecting promptly.—United States Gypsum Transp. Co. v. Dampskibsaktieselskabet, 48, F. (2d) 376.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York	Baltimore	New Orleans
(Exclusive of Domestic) —Entrances——Clearances—	(Exclusive of Domestic)	(Exclusive of Domestic)
No. Net No. Net		—Entrances——Clearances— No. Net No. Net
Month ships tonnage ships tonnage October, 1931 309 1,626,094 322 1,708,560	Month ships tonnage ships tonnage October, 1931 116 388,308 111 385,136	Month ships tonnage ships tonnage
September 523 2,724,761 522 2,641,711	September 111 350,556 117 362,970	October, 1931 174 502,867 195 563,095 September
August	August 122 374,434 118 377,085	August 179 484,245 172 474,230
June	June 127 376,049 114 338,066	July
April 496 2,538,201 527 2,656,992	May	May
March	March 123 385,514 107 336,157	March 185 545,474 188 537.148
January, 1931 486 2,417,338 542 2,533,711	January, 1931 121 386,924 127 412,306	February
Philadelphia	Norfolk and Newport News	Charleston
(Including Chester, Wilmington and the whole	(Exclusive of Domestic)	
Philadelphia port district) (Exclusive of Domestic)	-EntrancesClearances-	-EntrancesClearances-
—Entrances——Clearances— No. Net No. Net	Month No. Net No. Net ships tonnage	Month No. Net. No. Net ships tonnage ships tonnage
Month ships tonnage ships tonnage	October, 1931 25 76,385 54 146,995	October, 1931 20 49,738 22 55,371
October, 1931 69 192,159 57 160,609	September	September
September	July	July 13 26,985 10 20,974
July	May 22 63,739 49 140,356	May 9 16,418 7 11,884
May 82 235,108 62 170,497	April	April
April	February	February
February		
	Jacksonville	Galveston
Boston	(Exclusive of Domestic) —Entrances——Clearances—	(Exclusive of Domestic —Entrances— —Clearances—
(Exclusive of Domestic) —Entrances——Clearances—	No. Net No. Net	No. Net No Net
No. Net No. Net	Month ships tonnage ships tonnage Cctober 1931 10 25,659 9 17,710	Month ships tonnage ships tonnage October, 1931 35 80,748 112 354,607
Month ships tonnage ships tonnage October, 1931 98 325,261 66 241,072	September 6 12,463 8 18,888	October, 1931 35 80,748 112 354,607 September 27 63,896 99 320,127
September 109 339,482 78 263,783 August 131 388,799 98 305,488	August	August
July 131 362,111 94 290,733	June 11 24,902 13 24,517	June
June	May	May
April 107 292,403 89 233,756	March	March
February 76 259,402 57 190,598	January, 1931 14 28,243 10 15,617	January, 1931 25 45,442 84 260,555
January, 1931 76 245,382 49 195,091	Key West	Los Angeles
		LOS MIVELES
Portland, Me.	(Exclusive of Domestic)	(Exclusive of Domestic)
(Exclusive of Domestic) —Entrances——Clearances—		
(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage	Exclusive of Domestic —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage
(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931 17 39,060 16 34,195	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931 37 57,588 37 59,408	Exclusive of Domestic —Entrances——Clearances— No. Net No. Net
Month ships tonnage ships tonnage October, 1931	Exclusive of Domestic) Entrances— Clearances—No. No. Net Month ships tonnage ships tonnage October, 1931 37 57,588 37 59,408 September 36 54,012 35 55,610 August 37 56,505 37 56,505	CExclusive of Domestic -Entrances Clearances No. Net No. Net No. Net No. Net
(Exclusive of Domestic) —Entrances— —Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	(Exclusive of Domestic) —Entrances— Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	Carclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. N
(Exclusive of Domestic) —Entrances— —Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	(Exclusive of Domestic) —Entrances— —Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	CExclusive of Domestic -Entrances Clearances No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. N
Carclusive of Domestic Clearances No. Net No. Net No. Net	(Exclusive of Domestic) —Entrances— Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	Carclusive of Domestic -Entrances Clearances No. Net No. Net No. Net Month ships tonnage ships tonnage October, 1931
Carclusive of Domestic -Entrances Clearances No. Net No. Net No. Net Month ships tonnage ships tonnage October 1931 17 39,060 16 34,195 September 27 48,534 26 52,035 August 29 50,249 23 39,273 July 24 52,979 22 52,945 June 17 28,216 17 26,397 May 12 20,821 11 22,573 April 11 30,000 10 25,765 March 6 20,081 7 20,122 February 18 48,722 15 45,664	(Exclusive of Domestic) —Entrances— Clearances—No. No. Net No. Net Month ships tonnage ships tonnage October, 1931	CExclusive of Domestic -Entrances Clearances No. Net No. Net No. Net Month Ships tonnage Ships tonnage Cotober, 1931 215 720,162 193 678,776 September 199 580,683 196 593,882 August 199 673,223 204 676,036 July 170 622,694 176 636,440 June 179 659,029 149 568,208 May 210 696,717 194 731,392 April 225 644,178 209 626,590 March 224 602,763 210 623,023 February 181 557,981 196 561,570
Carclusive of Domestic -Entrances Clearances No. Net No. Net No. Net	Carclusive of Domestic -Entrances Clearances No. Net No. Net No.	CExclusive of Domestic -Entrances Clearances No. Net No. Net No. Net Month Ships tonnage Ships tonnage Cotober, 1931 215 720,162 193 678,776 September 199 580,683 196 593,882 August 199 673,223 204 676,036 July 170 622,694 176 636,440 June 179 659,029 149 568,208 May 210 696,717 194 731,392 April 225 644,178 209 626,590 March 224 602,763 210 623,023 February 181 557,981 196 561,570
CExclusive of Domestic Clearances	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931 37 57,588 37 59,408 September 36 54,012 35 55,610 August 37 56,505 37 56,505 July 39 59,268 41 62,526 June 63 81,660 63 86,349 May 83 91,683 80 90,758 April 60 55,493 51 54,656 March 60 69,731 56 72,956 February 61 70,169 56 69,443 January, 1931 61 82,218 57 30,394 Mobile (Exclusive of Domestic)	Carclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net
Carolisis of Domestic Carolisis Caro	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931 37 57,588 37 59,408 September 36 54,012 35 55,610 August 37 56,505 37 56,505 July 39 59,268 41 62,526 June 63 81,660 63 86,349 May 83 91,683 80 90,758 April 60 55,493 51 54,656 March 60 69,731 56 72,956 February 61 70,169 56 69,443 January, 1931 61 82,218 57 30,394 Mobile	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net Net No. Net No. Net No. Net No. Net No. Net
Carolisis of Domestic Carolisis Carolisis	CExclusive of Domestic Centrances - Clearances - No. Net No. Net No. Net	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net
CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931 37 57,588 37 59,408 September 36 54,012 35 55,610 August 37 56,505 37 56,505 July 39 59,268 41 62,526 June 63 81,660 63 86,349 May 83 91,683 80 90,758 April 60 55,493 51 54,656 March 60 69,731 56 72,956 February 61 70,169 56 69,443 January, 1931 61 82,218 57 30,394 Mobile (Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931 118 251,661 112 253,721	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October, 1931
Carolisive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October, 1931
CExclusive of Domestic Clearances— No. Net No. Net No. Net No. Net	(Exclusive of Domestic) —Entrances— —Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October, 1931 215 720,162 193 678.776 September 199 580,683 196 593,882 August 199 673,223 204 676,036 July 170 622.694 176 636,440 June 179 659,029 149 568,208 May 210 696,717 194 731,392 April 225 644,178 209 626,590 March 224 602,763 210 623,023 February 181 557,981 196 561,570 January 1931 191 673,620 193 753,720 San Francisco Exclusive of Domestic -Entrances - Clearances - No. Net No.
CExclusive of Domestic Centrances	CExclusive of Domestic -Entrances Clearances No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October 1931	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No.
CExclusive of Domestic Centrances	(Exclusive of Domestic) —Entrances— Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	CExclusive of Domestic -Entrances - Clearances - No. Net N
Carelusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net	(Exclusive of Domestic) —Entrances— —Clearances— No. Net No. Net Month ships tonnage ships tonnage October, 1931	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net
CExclusive of Domestic Centrances No. Net No. Net No. Net No. Net	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net	CExclusive of Domestic -Entrances - Clearances - No. Net N
CExclusive of Domestic Cotober 1931	CExclusive of Domestic -Entrances Clearances No. Net	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No.
CExclusive of Domestic Centrances - Clearances - No. Net No. Net No. Net No. Net No. Net Ships tonnage Ships tonnage October 1931	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net Ships tonnage Ships tonnage Ships tonnage September 36 54,012 35 55,610 August 37 56,505 37 56,505 July 39 59,268 41 62,526 June 63 81,660 63 86,349 May 83 91,683 80 90,758 April 60 55,493 51 54,656 March 60 69,731 56 72,956 February 61 70,169 56 69,443 January, 1931 61 82,218 57 30,394	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net No. Net Houston No. Net No. Net
CExclusive of Domestic Centrances - Clearances - No. Net No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October	Carclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October, 1931	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October, 1931
Carclusive of Domestic Carances	CEXCLUSIVE OF DOMESTIC	CExclusive of Domestic -Entrances - Clearances - No. Net N
CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October 1931 17 39,060 16 34,195 September 27 48,534 26 52,035 August 29 50,249 23 39,273 July 24 52,979 22 52,945 June 17 28,216 17 26,397 May 12 20,821 11 22,573 April 11 30,000 10 25,765 March 6 20,081 7 20,122 February 18 48,722 15 45,664 January 1931 14 40,247 15 46,602 Providence (Exclusive of Domestic) -Entrances - Clearances - No. Net No. Net Ships tonnage October 1931 6 23,833 6 23,836 September 6 20,330 3 11,160 August 10 41,671 3 12,240 July 6 25,062 7 30,748 June 6 21,104 3 12,211 May 9 37,120 2 3,674 April 8 32,848 6 25,101 March 5 18,288 4 17,400 February 9 43,707 8 30,036 January 1931 8 28,019 5 15,335 Portland Oreg (Exclusive of Domestic) -Entrances - Clearances - No. Net No. Net Ships tonnage October 1931 8 28,019 5 15,335 Portland Oreg October 1931 36 144,875 54 207,518 September 32 126,256 49 199,803 August 29 114,582 31 119,968 119,968 119,968 119,968 114,582 31 119,968 119,968 114,582 31 119,968 119,968 114,582 31 119,968 119,968 114,582 31 119,968 114,582	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net Ships tonnage Ships tonnage Ships tonnage Ships tonnage September 36 54,012 35 55,610 August 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 56,505 37 36,349 39 59,268 41 62,526 30 30 40 40 40 40 40 40	CEXCLUSIVE OF DOMESTICE Tentrances Ten
CExclusive of Domestic -Entrances - No. Net No. Ne	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net No. Net No. Net Ships tonnage Ships t	CExclusive of Domestic -Entrances No. Net No. Ne
CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net No. Net Ships tonnage ships tonnage September 27 48,534 26 52,035 August 29 50,249 23 39,273 July 24 52,979 22 52,945 June 17 28,216 17 26,397 May 12 20,821 11 22,573 April 11 30,000 10 25,765 March 6 20,081 7 20,122 February 18 48,722 15 45,664 January 1931 14 40,247 15 46,602	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net No. Net	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net Ships tonnage ships tonnage October, 1931 215 720,162 193 678,776 September 199 580,683 196 593,882 August 199 673,223 204 676,036 July 170 622,694 176 636,440 June 179 659,029 149 568,208 May 210 696,717 194 731,392 April 225 644,178 209 626,590 March 224 602,763 210 623,023 February 181 557,981 196 561,570 January 1931 191 673,620 193 753,720 San Francisco (Exclusive of Domestic) -Entrances - Clearances - No. Net No
CExclusive of Domestic -Entrances - Clearances - No. Net	CEXCLUSIVE OF DOMESTIC	CExclusive of Domestic Clearances No. Net No. Net No. Net No. Net No. Net No. Net Ships tonnage ships tonnage October, 1931 215 720,162 193 678,776 September 199 580,683 196 593,882 August 199 673,223 204 676,036 July 170 622,694 176 636,440 June 179 659,029 149 568,208 May 210 696,717 194 731,392 April 225 644,178 209 626,590 March 224 602,763 210 623,023 February 181 557,981 196 561,570 January 1931 191 673,620 193 753,720 San Francisco (Exclusive of Domestic) Exclusive of Domestic Cexclusive of Domestic Cexclusive of Domestic Cexclusive of Domestic Cexclusive 158 658,088 159 673,120 August 140 636,189 160 665,108 July 173 743,588 155 673,120 August 140 636,189 160 665,108 July 173 743,588 155 673,120 August 140 636,189 160 665,108 July 173 743,588 155 673,120 August 140 636,189 160 665,108 July 173 743,588 155 673,657 June 159 663,047 155 634,838 May 161 658,525 163 676,789 April 158 733,902 170 702,433 March 156 642,924 139 544,316 February 142 577,019 143 581,775 January, 1931 165 685,851 172 721,042 Houston (Exclusive of Domestic) Entrances Clearances No. Net Net Net Ships tonnage No. Net Net Net Ships tonnage No. Net Net Net Ships tonnage No. Net
CExclusive of Domestic -Entrances	CEXCLUSIVE OF DOMESTIC	CExclusive of Domestic Clearances
CExclusive of Domestic -Entrances - Clearances - No. Net No. Net	CExclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net Ships tonnage October, 1931 37 57,588 37 59,408 September 36 54,012 35 55,610 August 37 56,505 37 56,505 July 39 59,268 41 62,526 June 63 81,660 63 86,349 May 83 91,683 80 90,758 April 60 55,493 51 54,656 March 60 69,731 56 72,956 February 61 70,169 56 69,443 January, 1931 61 82,218 57 30,394 Mobile (Exclusive of Domestic) -Entrances - Clearances - No. Net	CExclusive of Domestic Clearances
CExclusive of Domestic -Entrances	CEXCLUSIVE OF DOMESTIC Tentrances	CExclusive of Domestic -Entrances No. Net No. Net No. Net Ships tonnage Ships tonnage Cotober 1931 215 720,162 193 678,776 September 199 580,683 196 593,882 August 199 673,223 204 676,036 July 170 622,694 176 636,440 June 179 659,029 149 568,208 May 210 696,717 194 731,392 April 225 644,178 209 626,590 March 224 602,763 210 623,023 February 181 557,981 196 561,570 January 1931 191 673,620 193 753,720 San Francisco (Exclusive of Domestic) -Entrances -Clearances No. Net



New Package Freight and Passenger Terminal for Rochester, N. Y.

By R. S. Mac Elwee

citizens at Rochester, N. Y., have been exerting their efforts to provide ample, modern, terminal facilities for lake shipping. Several advisory port commissions have been appointed and several efforts made to establish a regional port authority.

At the turn of the year a commission of five was created, two representatives being from Monroe county, Herbert H. Dalzell and Leo A. Mac-Sweeney; two representatives being from the City of Rochester, Stephen B. Story and John W. Fulreader; and a fifth member, a former member of the Harbor Advisory committee and former vice president of the chamber of commerce, Harry C. Stevenson, as chairman and neutral member. Franklyn J. Bonner, manager of the Monroe county regional planning board, is secretary and liaison officer with regional planning.

The firm of MacElwee & Crandall Inc., consulting engineers, specialists in ports and terminal facilities, were retained to make a comprehensive engineering and traffic survey, with particular emphasis upon the economic justification for port development. This full project, covering over 100 square miles of territory, in which soundings and borings were made during the winter, involved three possible sites,—that of the

The author, R. S. MacElwee, is president of MacElwee & Crandall Inc., consulting engineers, Cambridge, Mass.

"Pond" to the west; the Irondequoit bay section to the east; and the present small harbor at the port of Charlotte, in the Genesee river.

Preliminary Report is Presented

Early in the spring of 1931, due to the larger capacity of the Welland canal and the larger capacity of diesel electric barge canal and lake carriers requesting improved package freight facilities, a preliminary report upon the feasibility of the immediate development of a package freight terminal was called for and furnished by the engineers in advance of the complete study.

This preliminary, or initial, report showed that there were approximately 300,000 tons a year offered for transshipment at Rochester, with a possibility, through proper facilities offering economies in transfer and handling, of 500,000 tons. In addition, there are between 75,000 and 90,000 passengers a year handled through the present port of Rochester, to and from Canadian ports. These are handled by the Canada Steamship Co's passenger and package freight vessels of the typical side wheeler Great Lakes type, and by the carferries of the Ontario Carferry Co., a subsidiary of the Buffalo, Rochester, & Pittsburgh railway.

This being an international movement, these passengers are subject to customs and immigration supervision and inspection. An analysis of the types of vessels that will frequent the port, develop the following fine types:

			Loaded
	Length	Beam	Draft
1. Automobile Carriers, ft	400	50	18
2. Canal Lake motor barges	3,		
ft		40	17-19
3. Lake package freighters	3,		
ft		50	17-19
4. Carferries, feet		57	16
5. Small ocean vessels, fee	t 250		13

It will be noted that lake type automobile carriers have a high free board and unload from the top deck. For these a special travelling ramp moving laterally upon shipside tracks will be provided.

Suitable for Different Types

The Barge canal-lake diesel electric carriers have no handling equipment. For these it is necessary to transfer the freight by means of crawler cranes with long booms.

The lake type carriers including carriers of the Great Lakes Transit Co. and the Canada Steamship Co. discharge and load through side ports requiring ramp adjustments to meet fluctuations in the elevation of the deck, due to loading and water level.

Carferries discharge and load passengers to the promenade deck and load automobiles on their wheels from the stern.

The small ocean vessels now entering the Lakes through the present St. Lawrence canals, have a high free board and discharge through top

hatches using their own deck winches and booms for transfer.

It will be evident that these widely different types of vessels presented a demand for divergent types of shore equipment.

The area available between the right of way of the New York Central and Beach avenue is approximately 1400 feet. The problem is to construct an efficient terminal offering facilities for the transfer and handling and storage in transit, of package and bulk cargo, as well as passengers and automobiles on their wheels, with the maximum economy, efficiency, and dispatch in transfer and handling, from widely divergent type vessels.

Quay Type of Pier Adopted

To this end a quay type with marginal tracks and transit sheds was adopted, the quay wall being 1200 feet in length. Of this length 804 feet is a typical ocean quay of 30 feet width, carrying two railroad tracks, the shipside track being stopped 250 feet from the north end to permit the installation of four hinged ramps carried on gallows frames opposite transit shed No. 3. At the south end three hinged ramps are provided to facilitate transfer of cargo into the open storage space traversed by the track leads from the New York Central.

At the north end an additional hinged ramp leading to Beach avenue and a parking space between transit shed No. 3 and Beach avenue, is provided for tourists' automobiles being handled by carferry, and subject to customs inspection upon arrival and before clearance through the stockade.

This arrangement has made it possible to extend the inside wharf track the entire length of the structure and the shipside wharf track approximately 800 feet of this length, still leaving room for the side port ramps at each end of the quay.

It is estimated that the Barge canal vessels out-turn a maximum of 3000 tons of cargo with an average stowage factor of one and a half, i.e., measur-

ing on the average 60 cubic feet to the ton. To allow ample room for the use of large capacity skids and industrial lift trucks without high tiering, the central transit shed floor area is 261 feet 6 inches long by 120 feet broad. Transit sheds Nos. 2 and 3 are 241 feet 6 inches long by 120 feet broad.

Between the sheds is a truck court. Because of the limitation of space, this truck court is 50 feet wide. The pavement of the court is 42 inches below the wharf and transit shed floor level, on the same level as the connecting roadways. It is connected with the wharf by ramp. These courts offer 60 feet of tail board space at each end of the transit shed, with sliding shed doors, sliding vertically in two sections. In transit sheds No. 2 and No. 3 the loading area is set into the building, trucks backing into an additional loading court within the building.

Two Railroad Tracks Installed

The car loading platform in the rear of the transit shed is served by two railroad tracks and is made extra wide, 20 feet, in order to accommodate transshipment of automobiles to railroad cars and to give ample working room for the loading and discharging of railroad cars at the terminal.

It was decided by city council to construct only transit shed No. 1 at this time, with the anticipation that transit sheds Nos. 2 and 3 will be added as soon as the traffic movement has been firmly established.

The quay wall for 1200 feet is set inshore 70 feet from the line of the inshore end of the west jetty. The construction is carried out in the dry by excavating a trench. The wall is of the relieving platform type. The face of the wall below the water line is corrugated steel sheet piling and the relieving platform and vertical wall, with counterfort reinforcements and resting on timber piling tied back by tie rods to sheet piling anchor piles, is of concrete. The fill is rolled down and compacted to the

wharf level and paved with concrete. The railroad ties and tracks rest directly on this fill, which forms a deadening cushion. The wharf surface, flush with the tops of the rails, is of concrete slabs. The shed floor is laid upon a rolled and consolidated fill to floor level.

Protecting Quay Wall Fenders

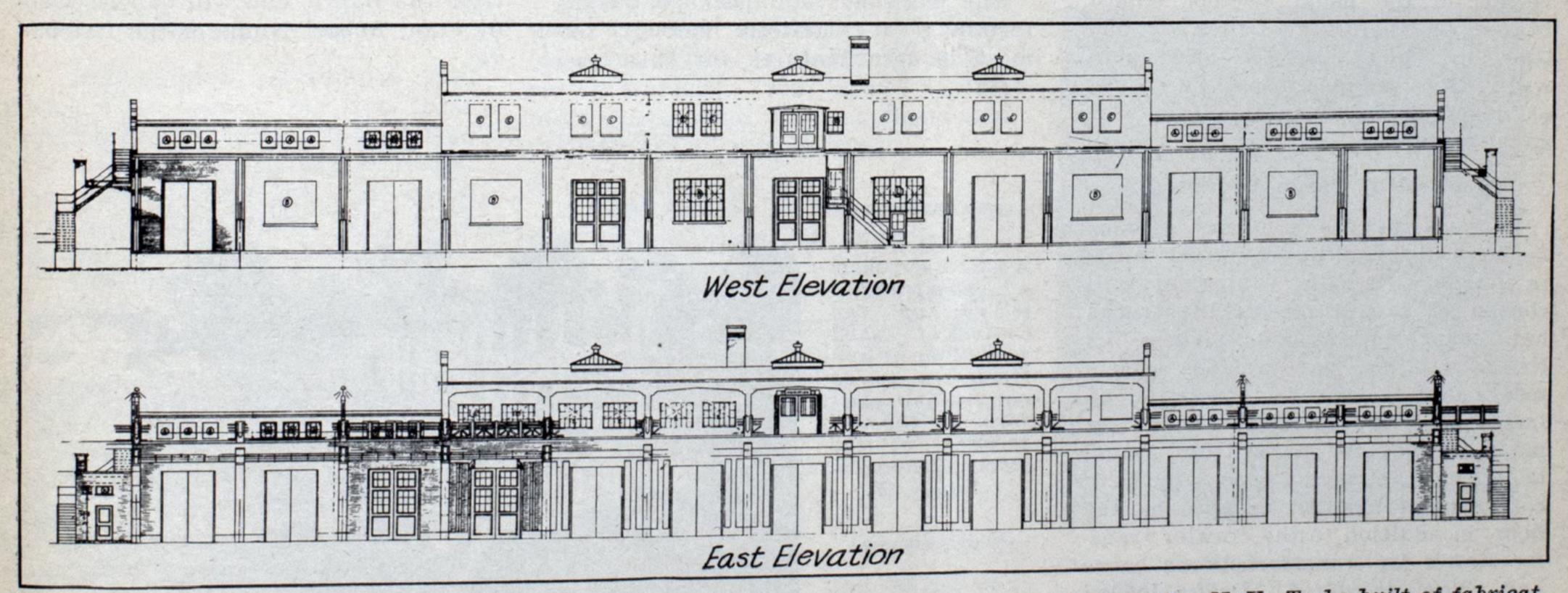
Mooring bollards are provided at frequent intervals in the quay wall. Two horizontal fender timbers are attached to the wall. It is intended to drive bumper piles with a space of 8 inches between the oak horizontal timber and the inside segment of the piling to permit flexible movement of the pile to absorb the kinetic energy of a vessel coming alongside.

Transit shed doors are of the double horizontal sliding type, placed in alternate bays. They are 10 feet wide by 14 feet high, to permit the use of crane attachments on the industrial trucks.

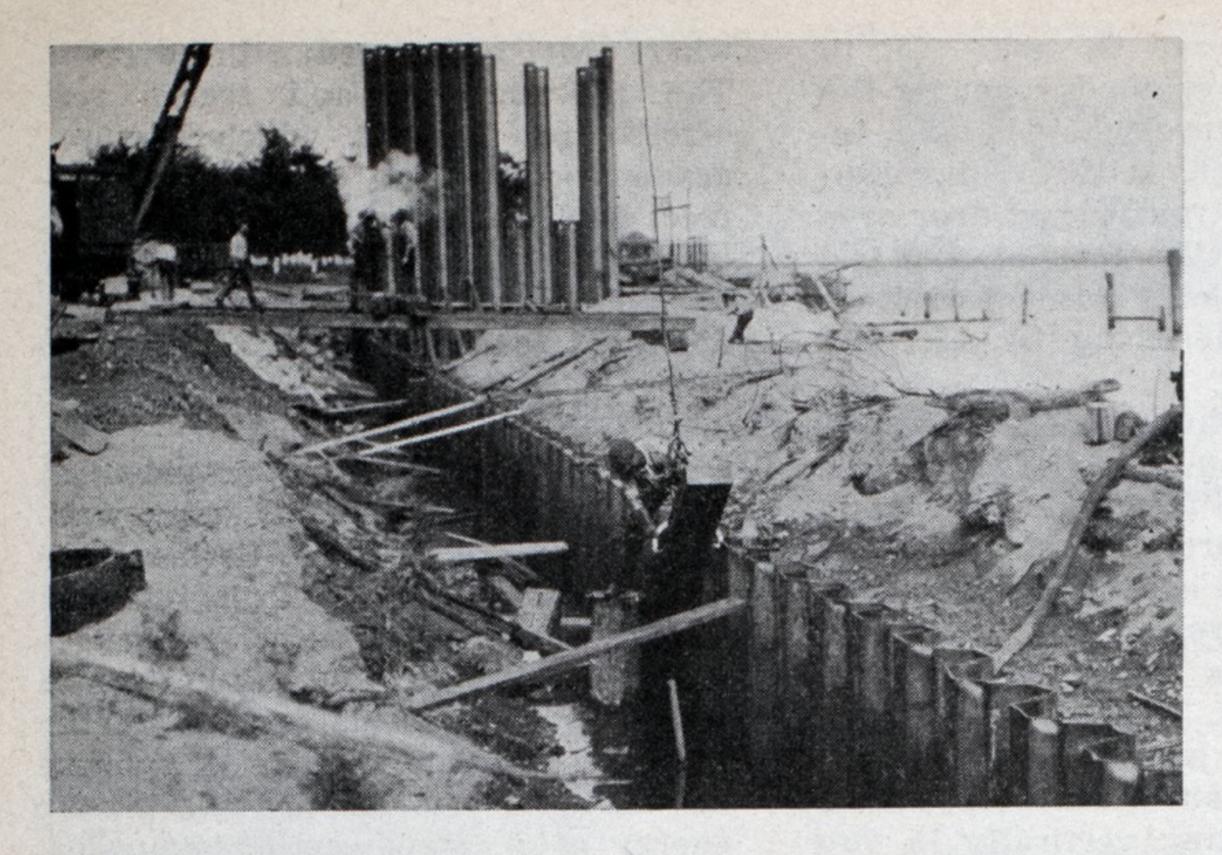
The transit sheds are of fabricated steel frame construction, steel frame windows, hollow tile and tapestry brick veneer walls, cast stone trim and architectural features with stucco walls for the second floor.

It was found that the additional cost was insignificant to make this marine passenger terminal harmonize architecturally with the very handsome buildings of the lake shore park recently constructed by the City of Rochester. The slight additional cost was also offset by future maintenance charges.

In various ports of the world passengers are handled across the wharf on a travelling gantry gang plank to a second floor passenger gallery in order to keep passengers away from the freight handling activities of the main deck where passengers are very much in the road and in personal danger. One of the best examples of the accommodations is that of the French line at Le Havre, France; of the Saint Pauli landing stage, at Hamburg; the Princes' landing stage, at Liverpool; and the most recent



Central transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of fabricated transit shed of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of the Charlotte terminals now under construction at the Port of Rochester, N. Y. To be built of the Port of Rochester, N. Y. To be built of the Port of Rochester, N. Y. To be built of the Port of Rochester, N. Y. To be built of the Port of Rochester, N. Y. To be built of the Port of Rochester, N. Y. To be built of the Port of Rochester, N. Y. To be built



Section of steel sheet piling in quay wall of the new passenger and freight terminal now under way at the Port of Rochester, N. Y.

development of this type is the stazione marittima, at Trieste, Italy.

To afford accommodations for passengers, the second deck of transit shed No. 1 has a 20-foot veranda the full length of the shed at the second story level, and a second story with a total floor area of 140 feet by 100 feet, reached from the veranda through a 10-foot wide double door and reached from the marginal street by a taxi curbing and stairway to a bridge across the railroad tracks and carloading platform. The lay-out of the passenger terminal accommodations includes large central main concourse and flanking offices to accommodate, first, customs and immigration inspectors' offices; and immigration rooms, one for men and one for women, each with a washroom and toilet; second, the offices for the port authority; and, third, three offices with two ticket windows each for the steamship companies. Also a women's rest room and a men's rest room, with accompanying washrooms and toilets, are provided.

It is intended to extend the veranda by a 10-foot bridge and promenade along the second floor of the two flanking transit sheds, No. 2 and No. 3, if, as, and when these structures are built. This will make it possible to dock four carferries and passenger vessels of the usual 300-foot length in use on the Great Lakes, at one time, in which case the passengers will walk to customs inspection rooms, or ticket offices, along this open veranda, or terrace.

Mechanical Cargo Handling

In view of the tendency toward mechanical handling of larger units in single lifts, the equipment will consist of fast, three-ton lift trucks handling three-ton skids. These lift trucks will also have various attachments for special cargo, including attachments for handling newsprint paper, cranes for heavy lifts, dump bodies, and retrieving scoops for bulk commodities handled in piles on the floor, in addition to the crawler transfer cranes for transfer between barge and shore, as stated. Drafts loaded onto skids, two to three tons to the

skid, will be placed on the wharf and then lifted by the industrial truck and moved to segregation point for sorting by marks and consignees, to railroad loading platform, to truck tailboard, or to storage point in the transit shed.

In addition to the cargo handling equipment, there will be two electric capstans to assist in mooring and turning vessels and in shifting cars on the shipside tracks.

A sum of \$500,000 was appropriated by the city council of the City of Rochester. Contracts were let to the following firms; I. M. Ludington's Sons Co., Inc., of Rochester; Stewart-Bennett, Inc.; Howe & Bassett Co., Inc.; Industrial Electric Co.; Dunbar-Sullivan Dredging Co., of Buffalo; and others.

The construction is under the department of public works, Harold W. Baker, commissioner; C. Authur Poole and William H. Roberts, engineers in immediate charge; and R. S. Mac-Elwee, president of MacElwee & Crandall, Inc., consulting engineers, supervising consulting engineer.

The entire layout was designed by R. S. MacElwee, detailed structural drawings in collaboration with James L. Crandall and J. Stuart Crandall, of the Crandall Engineering Co., Cambridge, Mass.

The passenger and package freight terminals at Charlotte embody the most modern features for this type of terminal developed to date.

This initial unit of the Port of Rochester does not meet the needs for a great industrial and bulk cargo harbor to accommodate vessels of large dimensions now having access to Lake Ontario through the Welland canal, nor the larger of the ocean vessels. The full report covering the large ship harbor location and equipment has been submitted by MacElwee & Crandall, Inc., to the Monroe County-City commission of Rochester.

Eye Clinic for Seamen

An eye clinic for seamen in the merchant marine was opened Oct. 29 at the Seamen's Church Institute of New York, 25 South Street, by the Rev. Dr. Archibald R. Mansfield, the superintendent. The clinic is known as the John Markle Eye Clinic in tribute to the donor, John Markle.

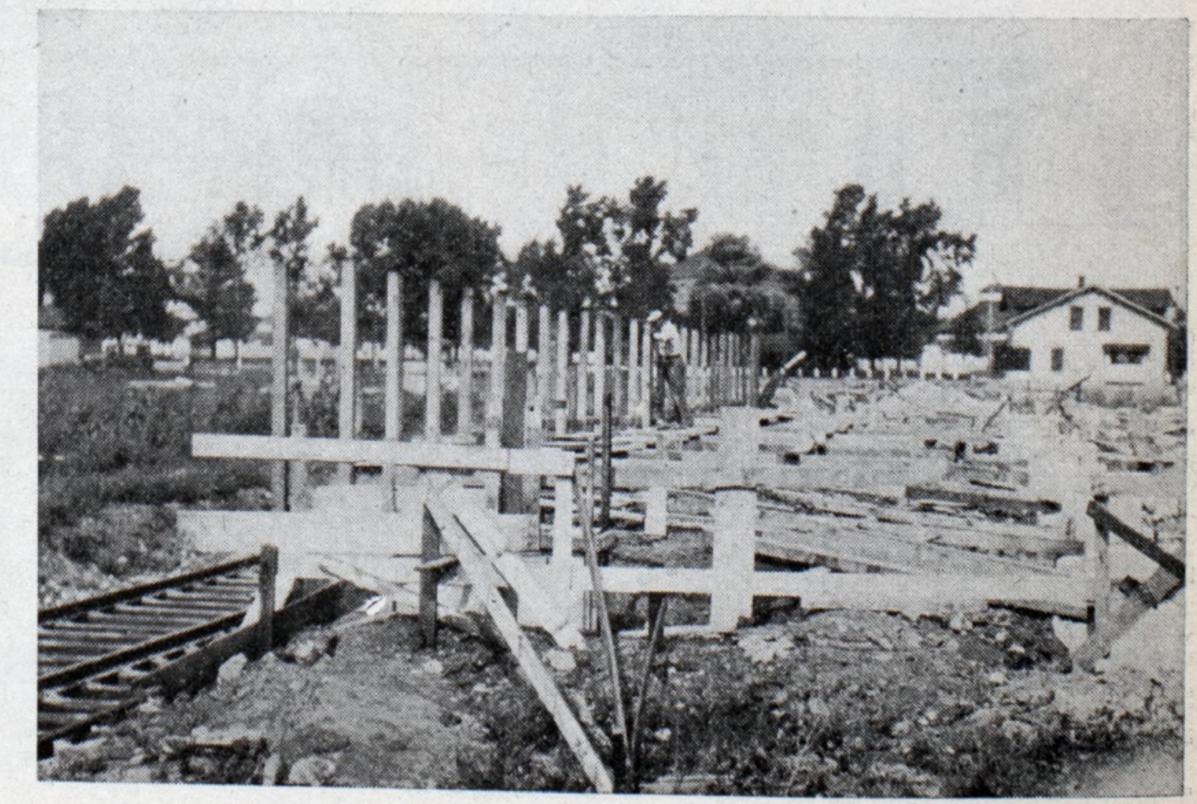
Owing to the retirement of three White Star line senior commanders from active service on Dec. 31, changes in commanders of several of the company's steamers will become effective at that time.

Captain Eustace R. White will relinquish his place on the Majestic, rounding out 33 years of service with the line. His successor will be Capt. E. L. Trant, formerly in command of the Olympic, who has been with the White Star line since 1899. The Olympic's new skipper will be Capt. John W. Binks of the Adriatic, who has served 32 years in the White Star fleet. The Adriatic will be in command of Capt. C. P. Freeman.

Captain J. B. Bulman who will retire from the Homeric, joined the company in 1899 and was first officer in the Olympic all through the World war. He will be followed in the Homeric by Capt. F. A. Frank, of the Calgaric.

Captain Evan Davies will retire from the Baltic and will be succeeded by Capt. Robert Hume of the Laurentic.

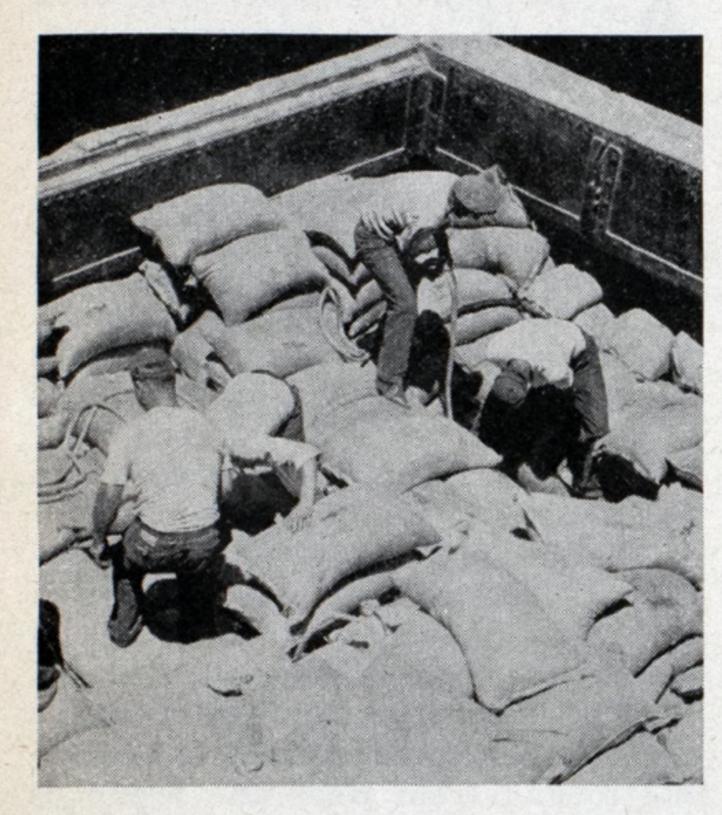
Another view of construction work on the transit shed footings and track to serve car loading platform for the new terminal at the Port of Rochester, N. Y.



Useful Hints on Cargo Handling



THE British Phosphate Co. has an interesting bulk handling operation on the islands of Nauru in the South Pacific. This loading plant is designed to load ships at the rate of 550 tons an hour. Conveyors 3000 feet long transport the phospate from the quarries to a 12,000 ton storage bin which is constructed with a Vshaped bottom. The phosphate slides through a series of gates to a 550 foot conveyor installed in a tunnel below the bin. This conveyor feeds other conveyors leading out over the water to the movable cantilever structure that carries the conveyor discharging into the telescopic chutes delivering the phosphate into the ship's hold.



Preparing slingloads in hold of vessel at sugar refinery, Crockett, Calif.

Another conveyor installation has been constructed at Ocean Island, South Pacific, for handling the same kind of cargo.

A Philadelphia stevedore discharged 1700 tons of pig iron from one hatch in eight hours, using three hooks to the deck and two overside. When loading case oil, the same stevedore handles eight cases to a sling and gets faster loading than other stevedores who put ten cases on a sling.

Hatch Covers in Sections

THE Moore and McCormick Line's hatch covers mentioned in the October issue are constructed in three sections, across the hatch, instead of the usual single or double board covers. Ring bolts are placed in two corners so that the sections may be

THIS page is being devoted to short items on all matters having to do with the more efficient turnaround of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.

lifted with ship's gear. When a hatch is to be cleared, the wooden covers are placed to one side on the deck and the strongbacks are placed in an upright position opposite the hatch. The wooden covers are then picked up and placed on top of the strongbacks to form a platform for the hatch tender.

The following is a record of the number of bags of raw sugar by two gangs at Crockett, Calif. in one day:

	Number of
Hours	bags handled
8-9	5264
9-10	5328
10-11	4608
11-12	4616
1-2	4870
2-3	4752
3-4	4528
4-5	4738

The new Oakland Outer Harbor terminals, Oakland Calif., have two warehouses in the rear of the cargo sheds which have been rented to two large packing companies. Cargo is transferred from warehouses to the sheds by tractors and trailers.

Pneumatic handling of bulk cargoes has been developed to a considerable degree in England. Steam coal is unloaded from barges by this means in London. Dry chemicals also are handled in this manner.

A large Coatswise line uses caster type trailers eight feet long instead of the standard six-foot type. The larger trailer was selected because the management found that the steep grades encountered into and out of side ports, often prevented a tractor handling two six-foot trailers, but the tractor could handle one eight-foot trailer, so that the average trailer load is heavier than if the smaller trailer were used.

The same Coastwise line carries as many as 150 loaded trailers on its

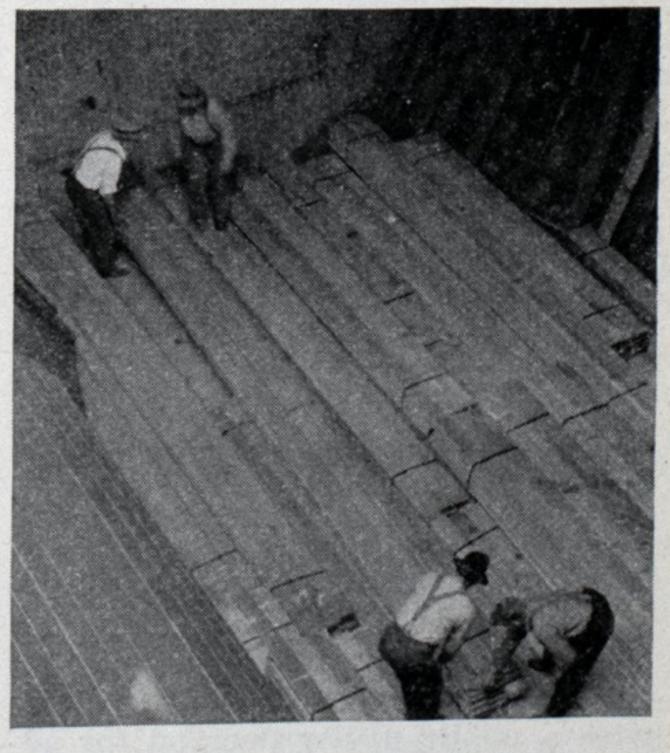
steamers making trips of several hundred miles in the open sea. Rope chocks around the caster wheels and tying groups of trailers in a unit, has made it possible to carry cargo on "wheels" with little difficulty. A special wooden type chock has been developed recently which will probably provide even better stowage. Carrying cargo on "wheels" or on skids has proved very economical, speeding handling of cargo and dispatch of ship to a remarkable degree.

"Progress becomes rapid only when facts are organized and principles formulated."—Alford.

A special type sling has been developed which will handle six drums at a time. Using a sling of this kind a carload of drums may be discharged in about twenty minutes.

On Fitting Strongbacks

NEW method of fitting strongbacks has been developed in England. The lugs in which the strongbacks usually rest are riveted to the vertical flange of the bulb angle which forms the top of the hatch coaming, instead of being riveted to the side of the hatch coaming. This method of fitting the lugs removes them from the location where there is the greatest danger from damage and increases the cubic of the square of the hatch. If the lugs should be damaged they can be more easily repaired since no staging is necessary. This design has been approved by Lloyds.



Stowing lumber packed in steel strapped bundles to reduce handling and spoilage

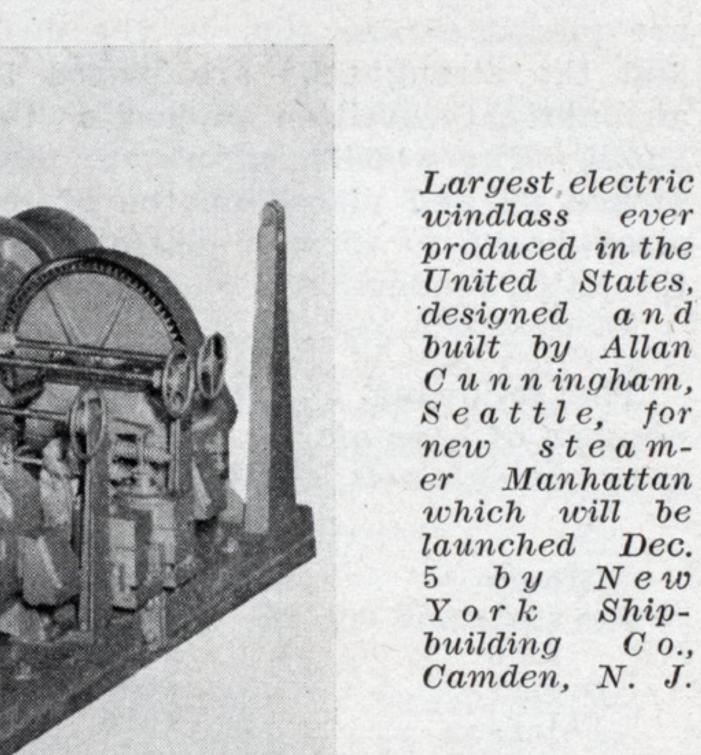
Equipment Used Afloat and Ashore

Largest Electric Windlass for S. S. Manhattan-Mercury Vapor Turbine Successful - Power Sweeper for Docks - New Sextant Perfected

THE largest electric windlass ever built in the United States and one of the largest in the world, is shown herewith just before it was lifted aboard the steamer TEXAN of the American-Hawaiian fleet for shipment from Seattle to New York. This 40ton windlass with a pulling strength of 120,000 pounds, is the product of the shops of Allan Cunningham, 124 West Massachusetts street, Seattle. It was specially built for the new 30,000ton American steamship MANHATTAN building at Camden, N. J., for the

Schenectady, for station power N. Y., capable of generating more than twice as much electric power per pound of process steam than is possible with the highest steam pres-Moreover, this electric power is produced at more than three times the thermal, or heat, efficiency attained in the best condensing steam plants. The highest efficiency now achieved in a condensing steam plant burning coal is 27 per cent. In the new generating station the power will be produced with a thermal ef-

than a hundred lumber mills has proved efficient in preventing sap stain or "blue stain" and mold in pine, sap gum, black gum, yellow poplar, magnolia and other hardwoods. The lumber is treated with a cold solution by either dipping or spraying. Losses from stain and mold are estimated to be \$10,000,000 annually. Lumber treated by the new method retains its bright clean appearance.



New

Ship-

C o.,



NEW power sweeper has been introduced for cleaning docks, piers, terminals, warehouses, sidewalks, paved yards and other large areas that must be swept frequently. It will clean approximately 42,000 square feet per hour and will handle light snow. The sweeper is mounted on a Clarkat trucktractor which is gas-powered for 24 hours' continuous operation. The 60-inch broom cleans a path 52 inches wide, sweeps right or left and the angle of sweep can be changed in less than a minute.

The broom is always under the driver's control and can be lowered or raised at will or by a special clutch lever can be stopped instantly. In high gear the equipment has a speed of 7½ miles per hour and going to and from work the broom is carried six inches above the floor or pavement. In operation best results are obtained at a speed of two miles per hour. The outfit may be equipped with generator and head and tail lights for night work. When sprinkler system is required, tank may be mounted on rear platform. The equipment is manufactured by the Clark Tructractor Co., Battle Creek, Mich.

United States lines. A second machine of the same size is now under construction for installation on the second vessel building for the same owners.

This windlass was designed by Mr. Cunningham and has many improvements and refinements over other machines used for the same purpose. While it is impossible to construct an entirely noiseless windlass, noise has been eliminated to a considerable degree and the new machine works with a marked absence of friction and annoyance, a condition highly prized on passenger vessels.

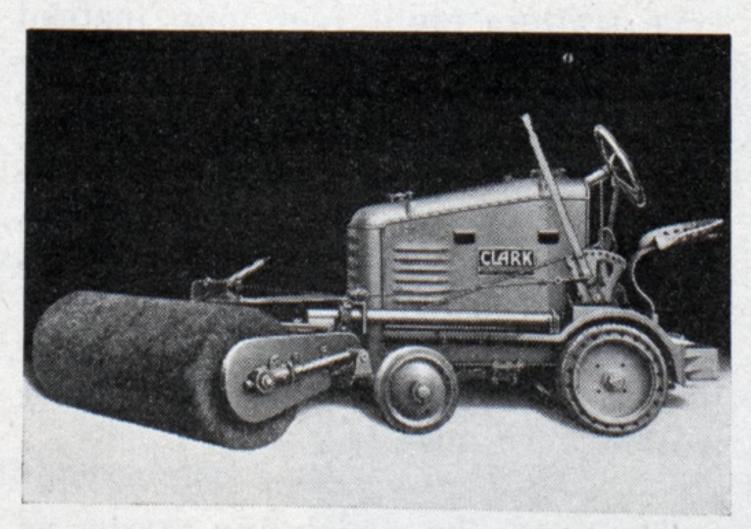
The Manhattan will have her anchors handled by the Cunningham windlass which will also warp the hugh liner into her berths. The 40ton lift to the deck of the TEXAN was one of the heaviest ever handled in one unit at any Pacific coast port.

Mercury-Vapor Turbine

Y co-ordinating industrial demands for process and heating steam with a public utility demand for added electric power, and by making use of the mercury-vapor process, the General Electric Co. has designed a

ficiency of the order of 85 per cent. When high pressure steam is used for generating electric power and this steam afterward used for process purposes, the electric power thus made is also produced with a thermal efficiency of approximately 85 per cent. However, as stated above, the large amount of high efficiency electric power is approximately 21/2 times as much with the mercuryvapor process as with high pressure steam.

A new disinfectant developed by E. I. du Pont de Nemours & Co., Wilmington, Del., and now used in more



New Clarkat Sweeper with 60-inch Broom

Perfects New Sextant

A new all weather sextant; invented by Paul H. MacNeil, Huntington, L. I., N. Y., recently passed the tests of the British admiralty and air ministry. It is claimed that by its use a ship or airplane navigator can get an observation no matter how thick the fog may be and obtain a record of the true altitude. Mr. MacNeil, who spent eight years in perfecting his instrument, is the technical director of the MacNeil Instrument Corp. and intends to open a plant in the near future for the production of the sextants.

Plan Reorganization of Royal Mail Co.

Tentative plans for reorganization of the Royal Mail Steam Packet Co. contemplate a decentralization of the services of the 40 companies of the combination, leaving such lines as the White Star, Pacific Steam Navigation, Lamport & Holt, Nelson, Elder Dempster and the original Royal Mail services to operate separately rather than as units of the one great combination, so that one will not be affected by financial difficulties of the others. Elevation of Walter Runciman to the presidency of the board of trade is expected to hasten completion of the reorganization plan as Mr. Runciman will probably find it necessary to divest himself of his responsibilities as chairman of the voting trustees of the Royal Mail in order to devote himself exclusively to his new duties.

New York Shipbuilding Corp.

Report of the New York Shipbuilding Corp., Camden, N. J.. (formerly American Brown Boveri Electric Corporation) and subsidiary for nine months ended September 30, 1931, shows net income of \$681,525 after taxes, interest, depreciation, etc., and after deducting \$125,476 nonrecurring net loss of electrical division for period Jan. 1 to July 15. The sale of this division was made July 15, 1931.

Opens Office Abroad

H. L. Stilwell, managing director of the Export Fibreboard Case association, San Francisco, who recently returned from a five months' visit of England, Wales, Ireland, Scotland, France and Germany, reports that a traffic service office for the associa tion was established in London and traffic service representatives were engaged for all the principal ports. These representatives will act in the same capacity as the traffic men in United States ports. Cargoes will be serviced and suggestions made to assist in the physical handling, every effort being made to lower costs for the shipper and prevent damage claims for operators and carriers. A great increase in exports in fiberboard cases has been made during the past six months and the association is now international in scope with members in Great Britain and Australia.

Loadline and Panama Canal

A ruling has been made by A. J. Tyrer, commissioner of navigation, in a letter to W. B. Hamilton, collector of the port at San Francisco, that the Panama canal is not a possession of the United States within

the meaning of the load line act, and that it is clearly not a foreign country. Consequently a vessel destined to a Panama canal, or in transit through the canal on a strictly coastwise voyage, is not a vessel leaving a port of the United States or its possessions on a foreign voyage and therefore is not subject to the load line act; but should any American vessel depart from a foreign country for the Panama canal zone she is subject to the act.

Raise Fund for Seamen

Special provision for the relief of unemployed destitute sailors in the port of New York has been made by the leading seamen's welfare agencies in connection with the joint emergency committee. A fund of \$100,000 is being raised for the relief of seamen who, not being residents in the port, are not eligible to appeal to other emergency relief organizations for the unemployed. Kermit Roosevelt, 1 Broadway, is treasurer.

The committee on Nov. 15 announced it was already prepared to provide food for 1000 seamen and has equipped emergency dormitories for this number, allotted as follows: Seamen's Church institute of New York, 400 beds; Mariners' League of the Salvation Army, 200 beds; Seamen's house of the New York City Y. M. C. A., 110 beds; the Danish-American Seamen's mission, 60 beds; the Swedish-Lutheran Immigrant home, 50 beds; and the German Seamen's home of Hoboken, 20 beds.

In addition to hundreds of citizens who are interested in the men of the merchant marine widespread co-operation has been given by officers and crews who have jobs in contributing to sailors who are without work.

Baltimore Propeller Club

At the regular monthly dinner meeting of the Propeller Club of the Port of Baltimore held Nov. 3, 84 new members joined bringing the roster up to 284. John Sonderman, president of the club, was elected a delegate to the national convention of the Propeller clubs to be held in Tampa Dec. 30 and 31.

Barge Canal Tonnage

Total tonnage of the New York state barge canal for the past season amounted to 3,351,618, an increase of 7267 tons over last season, according to the report of Canal Commissioner Ralph D. Hayes. Increased shipments of sugar, petroleum, flour and general merchandise offset the losses in wheat traffic during the year.

Higher Quality Steels

(Continued from Page 35)

taining 18 per cent chromium and another grade containing 18 per cent chromium and 8 per cent nickel offer good resistance to salt water corrosion and can be used beneficially in many instances where corrosion is acute. The latter grade has been used successfully for tanks, cable and marine hardware, and has been suggested for fire mains and other parts that cannot be protected from the destructive action of salt water. Corrosion resistance is a most valuable property where equipment is difficult or costly to replace.

Tests performed by Sir Robert Hadfield and reported early in 1930 in the Journal of the Society of Chemical Industry, indicate the corrosion resistance of the alloy steel. Test pieces were totally immersed in sea water during a period of 12 months, with the water changed every 14 days. An ordinary 0.15 per cent carbon steel showed a loss of 2.8 grams per 100 square centimeters of surface exposed; and 18-8 chrome nickel steel showed a loss under the same conditions of only 0.04 grams; while a 36 per cent nickel, 14 per cent chromium steel showed a loss of only 0.02 grams. If this test had been prolonged the showing would have been even more favorable for the alloy steels, since the protective coat formed on their surfaces would offer greater resistance to further corrosion.

Large sized steel forgings containing 13 to 18 per cent chromium have been used for marine work, such as tail shafts and pintles, where combined strength and resistance to salt water corrosion are required. The following good physical properties may be obtained in forgings made of corrosion-resisting steel; Tensile strength of 165,000 pounds per square inch; elastic limit of 135,-000 pounds per square inch; proof stress at 80,000 pounds per square inch; elongation in 2 inches of 12 per cent; and reduction of area, 40 per cent. Large ingots from 24 to 30 inches in diameter have been made from steel of this grade.

Marine engineers frequently object to the use of corrosion-resisting steel because of its high cost, without giving due consideration to the resulting saving in repairs, maintenance, and depreciation.

Development work is being done by steel companies and alloy manufacturers to find a rust-resisting steel suitable for ship plates, which will cost less than rustless steel and slightly more than carbon steel. Elaborate tests are now under way to determine the resistance of various kinds of alloy steel to sea water corrosion.

Personal Sketches of Marine Men

E. R. Richardson, President, Ocean Steamship Co. of Savannah

By Ben K. Price

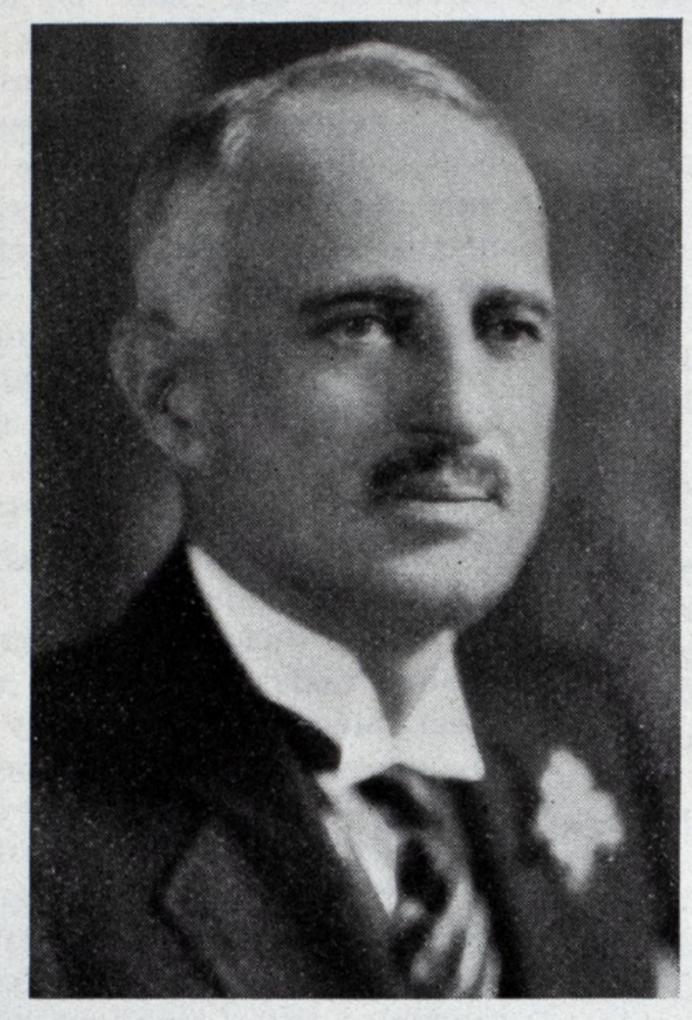


Photo by Ira L. Hill's Studio

N THE appointment of E. R. Richardson as president, the Ocean Steamship Co. of Savannah has selected a man whose experience in transportation extends over a period of more than 35 years. He is an authority on coastwise shipping, a fact recognized at the close of the World war, when he was made federal manager of the coastwise steamship lines, then under government control. His training has been particularly comprehensive. Not only has he worked up from the bottom in steady, thorough-going stages, but he has had experience in rail as well as marine transportation on the eastern and southern seaboards.

Mr. Richardson's first contact with transportation was in his home town of Marion, Va., where, upon graduating from high school, he became messenger and then clerk at the local station of the Norfolk & Western railroad. He likes to recall these days and how upon occasion of this latter advancement, he was given an 800 per cent increase in salary, to the round sum of \$40 a month.

About this time occurred an event which had a bearing on the course of his career. The general superintendent of the railroad came into town one day in his private car on official business and with him was a young secretary, who at once by his appearance of efficiency and general helpfulness attracted the attention of the young clerk. He seemed to be a man of tremendous importance, and when he left a few days later, the railroad clerk had decided he was going to have a job like that secretary.

He began by studying shorthand on his own account and finally borrowed enough money to take a course at the business branch of the University of Kentucky. Upon graduating he was given an appointment as a court stenographer, but that was not the type of work he was after and shortly he was again back in the transportation business, this time as stenographer in the freight claim office of the Florida Central & Peninsula railway, Jacksonville, Fla., under William H. Pleasants, general freight agent, with whom he later was to be closely affiliated for many years. The young southerner in due

HE HAS reached the presidency of this old and well known coastwise steamship line because of his broad practical knowledge.

HE IS thoroughly familiar with every phase of operation as his training during more than 35 years covers both rail and marine.

DURING the period of government operation his unusual experience was recognized in his appointment as federal manager of coastwise lines.

course became chief clerk and then secretary to Mr. Pleasants. With this step he achieved the goal of his youthful ambition, and he made good with plenty to spare, as indicated by subsequent events.

When the Florida Central was taken over by the Seaboard Air line in 1900, Mr. Pleasants, became general freight and passenger agent of the Ocean Steamship Co. of Savannah, with headquarters in New York City, and he took his secretary along. On the return of Mr. Pleasants to the Seaboard Air line in 1902, as traffic manager, Mr. Richardson went with him as chief clerk, and later in the same year, when Mr. Pleasants was appointed vice president and general manager of the steamship company, Mr. Richardson became chief clerk.

On Aug. 1, 1903, Mr. Richardson was appointed general freight agent and on May 1, 1907, freight traffic manager. When the federal government assumed control of shipping lines in April, 1918, he was made assistant to the chairman of the coastwise steamship advisory committee and in September of that year was appointed assistant to the federal manager of the coastwise steamship lines. In October, 1919, he was appointed federal manager, with 48 ships under his direction.

On March 1, 1920, Mr. Richardson was elected vice president and general manager of the Ocean Steamship company, a position he held until the past summer, when he was elected president.

The company now operates seven steel vessels, with an aggregate gross tonnage of approximately 40,000 tons. In the size of vessels there is likely to be little change, according to Mr. Richardson, for larger vessels would preclude the quick turn-around in port which is essential to efficient operation.

When the company was first organized in 1872, it had six boats, all side-wheelers, with schooner rig, some wood and some iron, with an aggregate gross tonnage of about 6500 tons and each capable of carrying 90 passengers. Two of these early iron vessels were in operation as late as 1900.

He is a member of the Maritime association, the Rail-road club, and the Southern Society of New York.

Up and Down the Great Lakes

Rules and Regulations for Winter Mooring—Looks for Early Closing—New Lighthouse—October Lake Levels—Coal Volume Less

HE Great Lakes district United States Salvage Association, Inc. has prepared a set of rules and regulations for winter mooring. Special limitations and restrictions are given which apply at various ports where winter mooring is considered hazardous. At ports not mentioned in this document, mooring will be considered only after application is made to the Cleveland office of the United States Salvage association. Following investigation, approval will be granted if found suitable, in which case mooring must be carried out under the supervison of the United States Salvage association's representative. By mutual agreement the United States Salvage association and the American bureau of shipping will co-operate to carry out the requirements and inspection necessary for the approval of moorings. The request for inspection and approval may be made at the office of the above society.

Season Closing Early

The last boats of the Pittsburgh Steamship Co. to take ore cargoes were loaded at the head of Lake Superior Oct. 31. Four stone cargoes were taken the week of Nov. 1, and after delivery the vessels of the company were through for the season.

The passenger season between Cleveland and Buffalo was closed Nov. 2, with the arrival of the steamer CITY OF BUFFALO of the Cleveland & Buffalo Transit Co. from Buffalo.

The passenger season between Cleveland and Detroit was closed Nov. 16. The last vessel of the Detroit & Cleveland Navigation Co. arrived in Detroit from Cleveland Nov. 15.

New Lakes Lighthouse

The new Detour lighthouse, in Lake Huron at the mouth of the St. Marys river was placed in commission on Nov. 10, two years having been required for its construction, according to the lighthouse service of the department of commerce. This lighthouse, the most important piece of lighthouse engineering upon the Great Lakes, since the building of Poe Reef and Fourteen Foot Shoal lighthouses, stands

upon a submarine site nearly a mile from shore, on the outer end of Detour Reef. It is passed by all the vessel traffic originating in or destined for Lake Superior and the St. Marys River.

October Lake Levels

The United States Lake survey reports the monthly mean stages of the Great Lakes for the month of October as follows:

	Feet above	
Lakes mean	n sea level	
Superior	602.44	
Michigan-Huron	578.52	
St. Clair	573.69	
Erie	570.92	
Ontario	244.24	

Lake Superior was 0.06 foot higher than in September and 0.29 foot lower than the October stage of a year ago.

Lakes Michigan-Huron were 0.11 foot lower than in September and 1.82 feet lower than the October stage of a year ago.

Lake Erie was 0.31 foot lower than in September and 1.36 feet lower than the October stage of a year ago.

Lake Ontario was 0.35 foot lower than in September and 2.00 feet lower than the October stage of a year ago.

Elected Chairman

G. A. Tomlinson was elected chairman of the board and J. S. Ashley was elected vice president of the Great Lakes Towing Co. at a meeting of the directors, Oct. 28. Mr. Tomlinson has been serving the company as a director for more than 20 years. He is also president of the Cleveland & Buffalo Transit Co., and chairman of the board of the American Ship Building Co.

The assembly room of licensed officers of the Lake Carriers' association was opened for the winter season Monday, Nov. 16, in the Commercial Bank building, Cleveland.

Lowest Since 1921

During the month of October, upper Great Lakes ports shipped 3,094,-424 tons of ore as compared with 5,531,285 tons for October, 1930. Shipments for the season of 1931 to Nov. 1, were 23,047,192 tons. This

represents a decrease of 21,548,102 tons compared with the same period in 1930, when 44,595,294 were moved. This represents a decrease of 48 per cent.

According to the Lake Superior Iron Ore association, Duluth leads all ports in shipments for the season; Superior is second. The movement for the season of 1931 for which reports were received as this issue was going to press, amounted to only 23,-467,786 tons. This is the smallest movement of ore on the Great Lakes since 1921.

According to report of the ore and coal exchange, shipments of coal for October were 4,571,504 tons as compared with 4,411,800 tons for October, 1930. Total shipments for the season to the end of October were 27,250,266 tons as against 32,235,-094 tons for the same period in 1930.

On Nov. 18, there were 46 vessels in the storage grain fleet at Buffalo.

Movement of Pig Iron

Final deliveries of pig iron by boat before the close of Great Lakes navigation brought active shipping late last month. This made November one of the best shipping months of the year, particularly at Lake Michigan ports.

More than 10,000 tons of high silicon silvery iron was shipped to the East Chicago docks from Lake Erie late last month. This will be allocated to melters by rail during the winter. The favorable weather also aided in the movement of about 12,000 tons of charcoal pig iron from the Lake Superior furnaces to the Chicago and Milwaukee districts. About 8000 tons of this charcoal iron will be distributed during the winter months from the East Chicago docks, and about 4000 tons was unloaded at Milwaukee.

Early in November about 12,000 tons of merchant pig iron was shipped by boat from South Chicago to the western Michigan foundries working on automotive accounts. This shipment included about 500 tons of silvery iron that previously was shipped by boat from Cleveland, and later was billed to a western Michigan port.

Reviews of Late Books

Water Transportation, by M. E. Pellett, buckram, 685 pages, 6 x 9 inches, published by the H. W. Wilson Co., New York, and supplied by MARINE REVIEW for \$10, postage paid, and in Europe by the Penton Publishing Co., Caxton House, London, for 50s, postage extra.

The author, who is special assistant of the Port of New York Authority and founder of the Port of New York Authority library, has for 10 years been engaged in the compilation of a bibliography on water transportation, to be published in five volumes. This first volume, which is a bibliography, guide and union catalog on water transportation covering harbors, ports and port terminals, is divided into three parts. Part I, devoted to general works, covers engineering, construction and materials; equipment; port development and administration. Part II covers the ports of the world, giving geographic subdivisions embracing Africa, Asia, Australasia, Europe, North America and South America. Part III covers periodicals, proceedings and transactions; author index; subject index and list of publishers. The book should prove of great value to those striving to improve the world's transportation facilities and general channels of trade.

Cabin Songs, by Elizabeth J. Stephens, paper, 47 pages, 6 x 9 inches; published by Bruce Humphries, Inc., Boston, and supplied by Marine Review for 50 cents.

This song book is a collection of old-time melodies set to verses of a nautical character and includes such old familiar tunes as "old Black Joe," "Jingle Bells," "Marching Through Georgia," etc.

Standards of The Hydraulic Society, sixth edition, paper, 96 pages, 8½ x 11 inches, published by the Hydraulic Society, 90 West street, New York, price \$1.

This enlarged edition shows numerous additions and changes including an index, a list showing the different types of pumps made by the member companies, illustrations of the rotation of centrifugal pumps, new definitions and illustrations of thrust bearings, illustrations of correct and incorrect methods of connecting suction pipe to a centrifugal pump, a revision of recommendations of materials for pumping special liquids, and a section on friction of paper stock in cast iron pipe, including nine pages of pulp friction curves.

Johnson's Steam Vessels and Motor Ships, 1931 edition, cloth, 301 pages, 8½ x 4½ inches, published by Eads Johnson, M. E., Inc., New York, and supplied by MARINE REVIEW, Cleveland, for \$5 plus 15 cents postage and in Europe by the Penton Publishing Co., Ltd., Caxton House, London, for 25s, postage extra.

This book is a directory of American-owned, self-propelled commercial craft. The edition has been brought up to date to give the ownership of vessels in convenient form for quick reference. An index in the front of the book gives alphabetically the names of vessels together with owners. This is followed by an alphabetical list of owners, which gives the names of all vessels owned in any one fleet, the date and yard where built, type, dimensions of hull, gross and net tonange, horsepower and engine and boiler particulars. The rear pages of the book are devoted to designs of typical vessels, which should prove of interest to owners.

Annual Statistical Report of the American Iron and Steel Institute for 1930, cloth, 120 pages, 6 x 9 inches, published by the American Iron and Steel Institute, 75 West street, New York.

This report contains the statistics of the iron and steel and allied industries of the United States and Canada for the year 1930 and preceding years. Data relating to production in the principal foreign countries have been continued in this volume, consisting of tables showing the production of iron ore, pig iron, and steel ingots and castings for the period 1905-1930 so far as available. There has also been continued an analysis of the tonnage of iron and steel products exported to principal foreign countries for the years 1926 to 1930 inclusive. New data includes the average production of pig iron per blast furnace day by blast furnaces making coke pig iron for the period 1926-1930, and for 1930 only the production of concrete bars divided into classes is given.

The Port of Buffalo, N. Y., Lake Series No. 1; The Ports of Miami and Tampa, Fla., Port Series No. 8, Part 2; The Ports of Los Angeles and Long Beach, Calif., Port Series No. 13, Part 1; The Ports of San Diego and San Luis Obispo, Calif., Port Series No. 13, Part 2; paper, 6 x 9 inches, published by corps of engineers, United States army, and the bureau of operations, United States shipping board; supplied by the Superintendent of Documents, Washington, as follows: Port of Buffalo, 50 cents; Miami and Tempa, 40 cents; Los Angeles and Long Beach, 60 cents; San Diego and San Luis Obispo, 45 cents.

These volumes, units in an extend-

ed port series, show in detail the facilities available for handling traffic, such as piers, wharves, docks, ship repair yards, dry docks and marine railways, coal and oil bunkering plants, grain elevators, storage warehouses and other port equipment. Information is also given regarding port and harbor conditions, port customs and regulations, services, charges, and supplies; floating equipment, wrecking and salvage equipment, railroad and steamship lines and their charges and practices in connection with terminal service. Foreign and domestic commerce is discussed and tables are presented showing in detail the business of the port during recent years. The volumes are illustrated with original maps, charts, diagrams and photoraphs.

Handbook of Oil Burning, by Harry F. Tapp, leather, 629 pages, 4¾ x 7 inches; published by American Oil Burner association, New York, and supplied by Marine Review, Cleveland, for \$3 plus 15 cents postage, and in Europe by the Penton Publishing Co., Caxton House, London, for 15s, postage extra.

Information of great practical value to the marine engineer interested in oil-burning power or heating equipment is contained in this new volume. In addition to data, charts and tables on the use of oil for fuel, there is detailed information on such points as the characteristics and properties of different fuels, the chemistry of combustion and flame, comparative fuel costs and fundamentals of heat and heat transfer. The book contains 123 tables and 358 illustrations and is well arranged throughout.

The Protection of Seamen in Case of Sickness, Including the Treatment of Seamen Injured on Board Ship, by the International Labour Office, Geneva; paper, 343 pages, 5½ x 8¼ inches, issued abroad and available in the United States only through the American agent, the World Peace Foundation, 40 Mt. Vernon street, Boston; price, 75 cents.

This book is a report of the second discussion held on the subject by the International Labour conference and includes the replies made by 25 countries. It is in two parts, the first part being devoted to the individual liability of the shipowner toward sick or injured seamen and the second part to sickness insurance for seamen. Each part consists of three chapters, Chapter I containing the replies of the governments in full, Chapter II consisting of a general survey of the replies, and Chapter III being a brief summary of the conclusions to be drawn from the replies of the governments and the text of a proposed draft convention. The conference will hold a second and final discussion on the basis of this report in due course to adopt definite proposals in the forms provided for in the treaty.

Mathe Reg Rev Dewick

The National Publication Covering the Business of Transportation by Water

December, 1931

The American Merchant Marine

THE Society of Naval Architects and Marine Engineers at its annual meeting in New York authorized its president J. Howland Gardner to appoint a committee to conduct an engineering investigation of every phase of the shipping and shipbuilding situation.

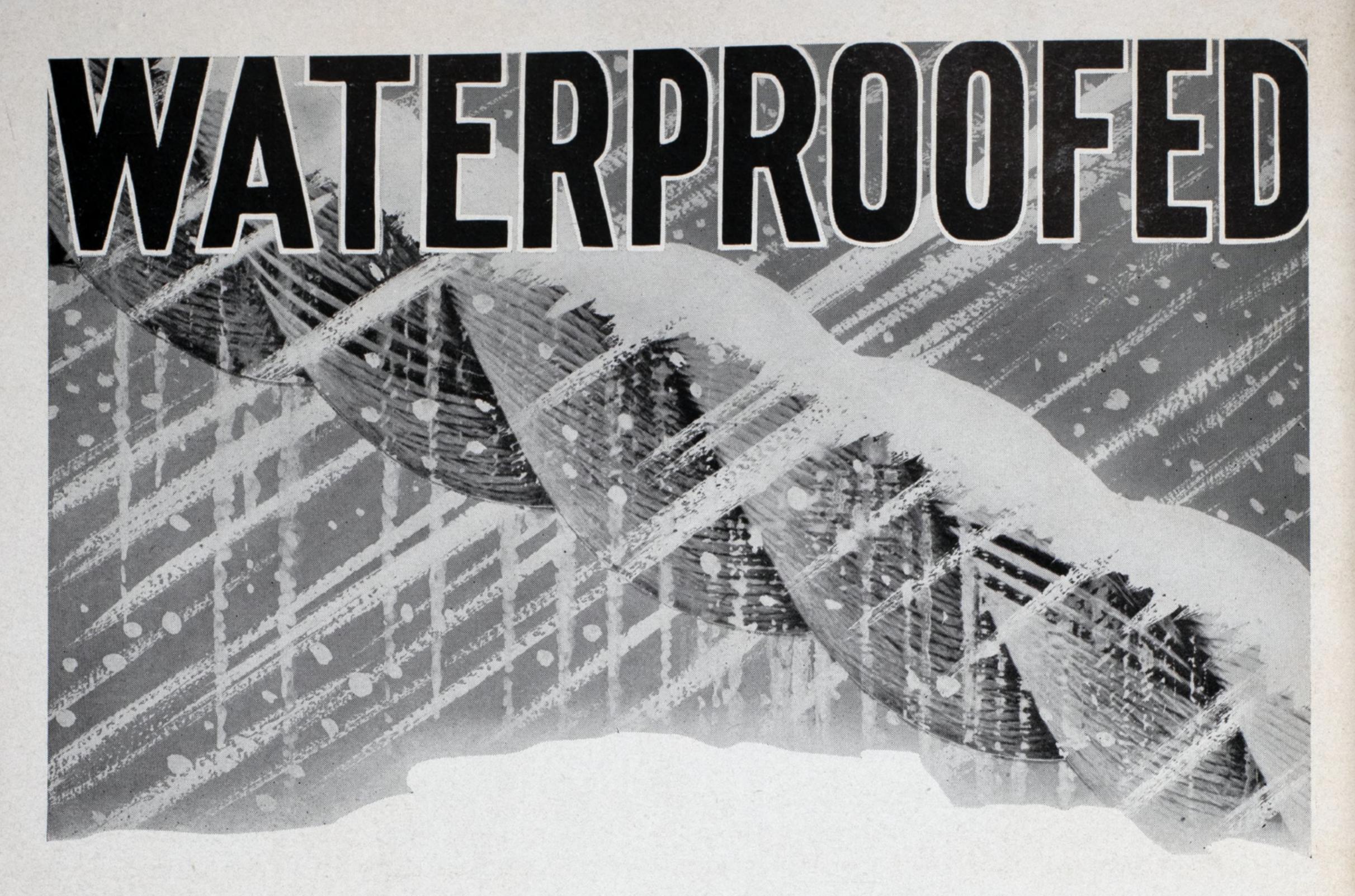
Every state in the Union contributes to the important industries of shipbuilding and ship operation. The Congress of the United States expressing the will of the people has given its mandate in favor of an American merchant marine for carrying our goods on every trade route in the world in time of peace, and in an emergency to make us independent of other maritime powers.

It is the purpose of this committee to determine the cost of building ships in this country in order to establish a correct basis of comparison with the cost of construction in foreign shipyards. It will estimate the tonnage needs of our commerce so that our ship operating companies will know what is required for an efficient merchant fleet second to none in the world.

Definite recommendations will be made by this committee, after careful study, as to ways and means of equalizing the differentials in cost of construction and operation between the American merchant marine and that of foreign nations.

Coordination of all studies made by independent organizations on the subject of our merchant marine will be one of the primary functions of this committee. Its personnel will be carefully selected to include outstanding engineers and business men.

Realizing the importance and objectives of this committee MARINE REVIEW calls on all friends of the American merchant marine to extend their active support to the end that its future may be comparable to the brilliant past in the days of sail.



BRING ON YOUR WINTER

Let it snow—thaw and freeze! Bring on your worst gales and blizzards! Unleash winter's fury with all its demolishing power. Then look to your lines.

Just as the famous Columbian Waterproofing method has sealed Columbian Tow-Ro against the germs of decay and rot, it has also sealed Tow-Ro against the action of ice and snow. You will find Columbian Tow-Ro flexible and easy to handle whether the temperature is below zero or 100° in the shade.

For winter towing or for use as a spring line, Tow-Ro will do a perfect job for you. No matter how wet it becomes, it is the most flexible rope on the market.

Columbian Waterproofing alone makes Tow-Ro all that could be desired of a rope, but this feature together with its new construction and the Columbian Guarantee gives Tow-Ro a value that is incomparable.

Let us tell you more about Tow-Ro-how it is made and the advantages of this new patented construction. A post card containing your request will be sufficient evidence that you wish to receive this information.

COLUMBIAN ROPE COMPANY

332-90 Genesee Street Auburn, N. Y. "The Cordage City"

Branches:

M-6

New York

Chicago

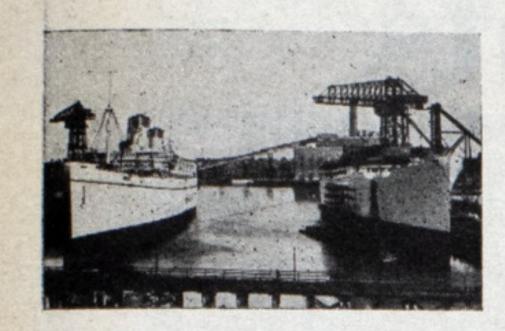
Boston

New Orleans

COLUMBIAN TOW-RO PATENTED

BETHLEHEM

SHIPBUILDING and REPAIR FACILITIES on the ATLANTIC COAST

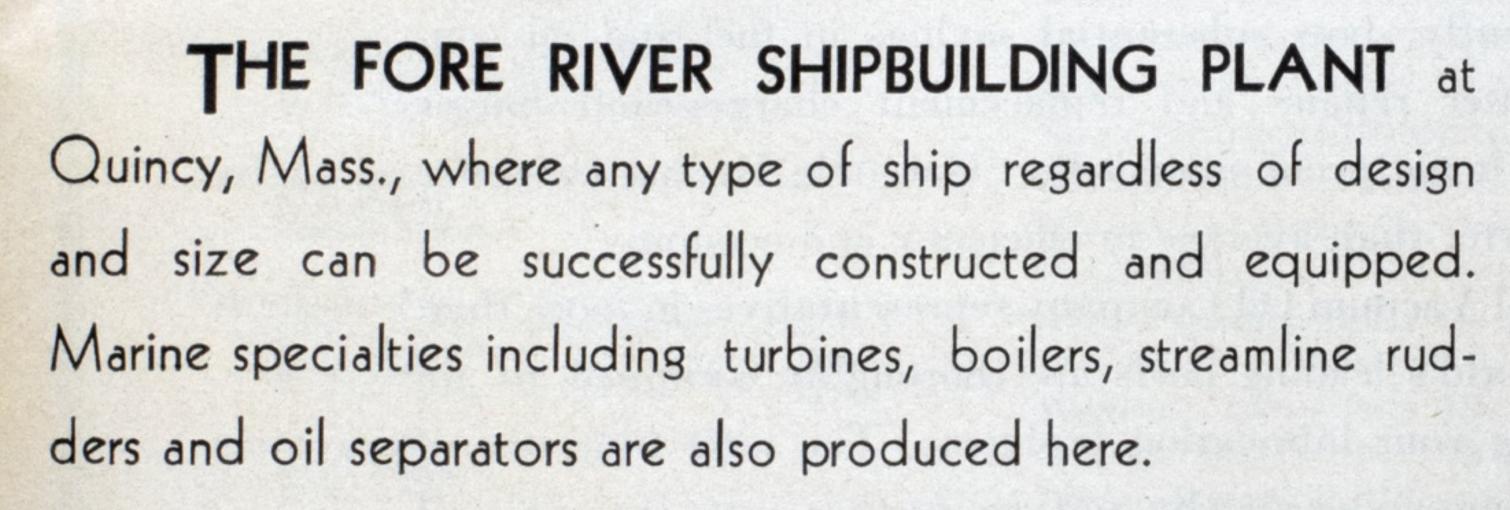


THE ATLANTIC COAST FACILITIES of Bethlehem Shipbuilding Corporation are complete for taking care of every need of ship owners and operators. Ample docking accommodations provided with every modern convenience, well laid-out and equipped plants, trained

personnel and convenient locations insure prompt and efficient handling of any and all marine requirements.

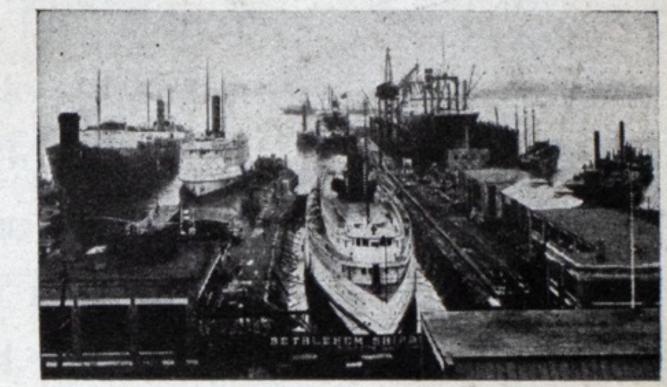
The various units on the Atlantic Coast are as follows:—

TWO SHIP REPAIR YARDS on Boston Harbor, operated and equipped to do any and all jobs on all sizes and types of floating equipment.

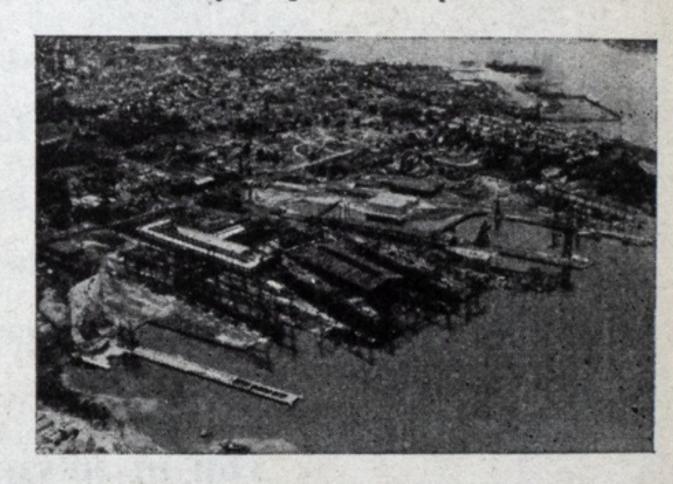


AN UP-TO-DATE REPAIR PLANT at Baltimore, planned to meet every requirement of vessels entering this port.

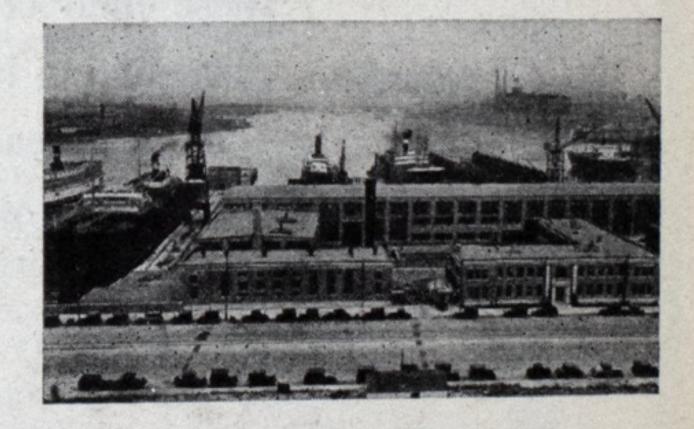
A SHIPBUILDING UNIT at Sparrows Point, Md., for building scows, barges, and car ferries.



General View of Simpson Works on Boston Harbor



Fore River Shipbuilding Plant



Baltimore Dry Docks Works, Upper Yard

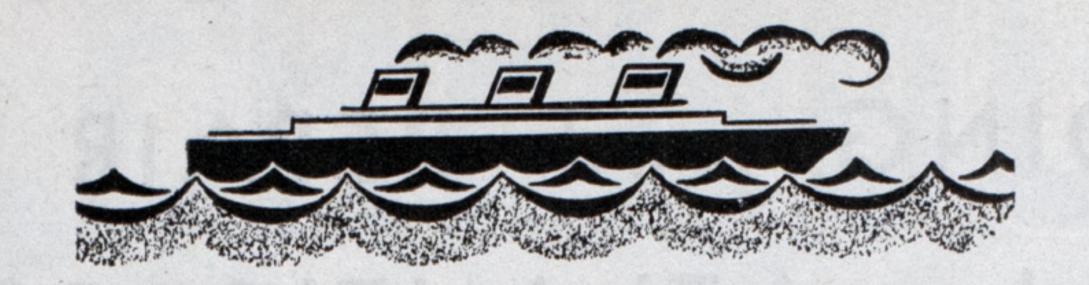
BETHLEHEM SHIPBUILDING CORPORATION, LTD.



GENERAL OFFICES: BETHLEHEM, PA.

General Sales Offices: 25 Broadway, New York City and 20th and Illinois Sts., San Francisco
District Offices in Boston, Baltimore, and San Pedro

BETHEREM



A dollars-and-cents proposition

MARINE experts agree that a great deal of today's engine trouble and maintenance expense is due directly to the use of unsuitable oils and, therefore, could easily be avoided.

In view of this fact, any sound comparison of the cost of lubricating oils must be made on the basis of the service they give, month after month—the cost per running mile.

When the bulk of the world's tonnage is regularly lubricated with Gargoyle Marine Oils and when the performance records of these ships consistently show substantial savings in fuel and oil consumption, fewer repairs and replacement charges and longer engine life, is it not proof enough that Gargoyle Marine Oils offer something better than average in efficiency and economy?

Experienced Vacuum Oil Company representatives in more than 300 of the world's leading ports are thoroughly equipped to aid you in solving your lubrication problems. The next time one of these men comes aboard why not go further into this idea of cost-cutting lubrication?

In the meantime, we will be glad to send either of these help-ful books, without obligation: "Steamships with Reciprocating Engines" or "Marine Lubrication—Motorships." Address: Vacuum Oil Company, Marine Sales Dept. D-12, 61 Broadway, New York.



Marine Oils

A grade for each type of service

VACUUM OIL COMPANY

Safeguarded WHEN SHE PUTS TO SEA

60-cell Exide Battery will keep radio communication alive . . . make lights certain aboard the S. S. Florida

The new ship "Florida" of the Peninsular and Occidental Line is taking no chances with possible power failure. She is equipped with a 60-cell Exide Marine Battery. In case of emergency, this powerful battery will automatically and instantly take over the job of furnishing power for the ship's radio and her entire emergency lighting system. Two sets of 12-cell Exides are used for the interior communication system.

Aboard ships in tropical service, or on vessels plying the Arctic lanes, Exides have proved their dependability. No matter how severe the conditions, Exide Batteries respond to the call of the crew, either to light the ship or to send a radio message to the outside world. Not only for radio and light safety, but for auxiliaries, pumps, steering gears... Exides furnish dependable power and assure safety on any ship.

EXIDE

Cut-away cell showing construc-

tion like that of no other battery

made. The reason for Exide-

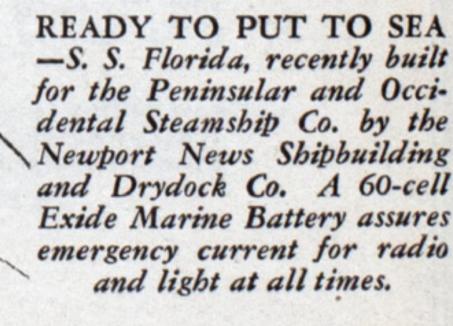
Ironclad dependability, long life

and economy.

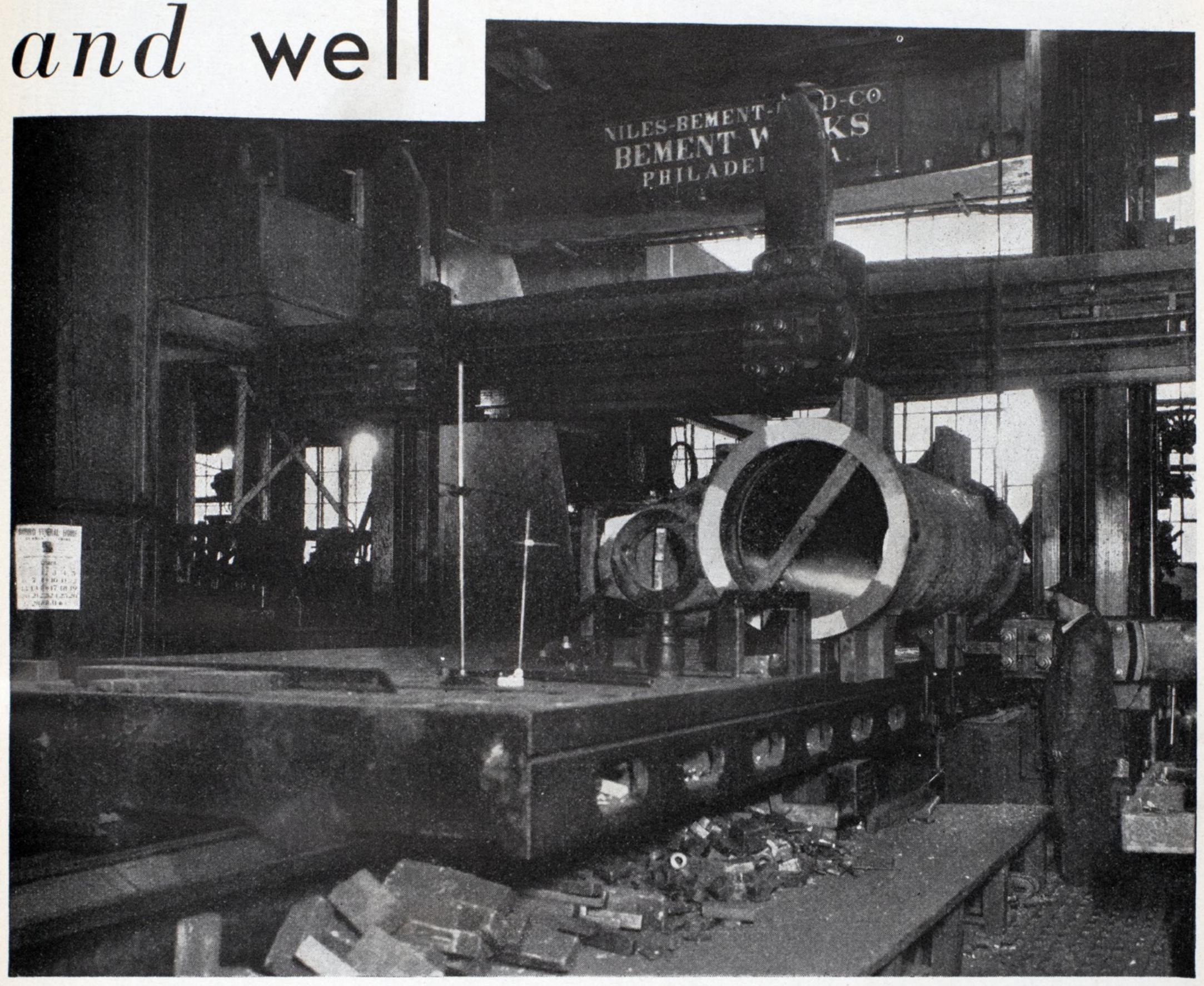
THE ELECTRIC STORAGE BATTERY CO.
Philadelphia

BATTERIES

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE Exide Batteries of Canada, Limited, Toronto Write for information on Exides and Exide-Ironclad Batteries and their many varied applications in marine service. You will be interested in our new Bulletin-Form No. 3420. No obligation.



To Serve you swiftly...



than suggest the complete, modern to do their work: The best way possible. facilities for building, repairing and altering ships at American Ship's five conveniently located yards.

But American Ship's resources are not limited to machinery, materials and equipment. Each yard is peopled with skilled, you have been considering, now?

HIS photograph above does no more experienced men who know only one way

Thus this result is inevitable: Every job done at American Ship is a good job and completely dependable.

May we have instructions on those ship repairs, alterations or improvements that

The AMERICAN SHIP BUILDING CO.



LORAIN American Ship Building Co.

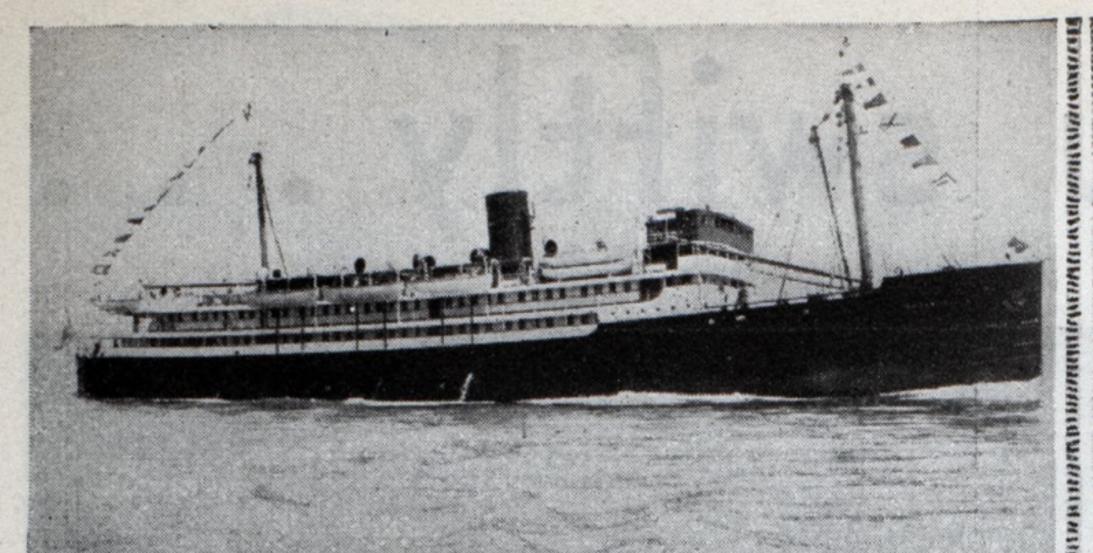
BUFFALO Buffalo Dry Dock Company

SOUTH CHICAGO Chicago Ship Building Co.

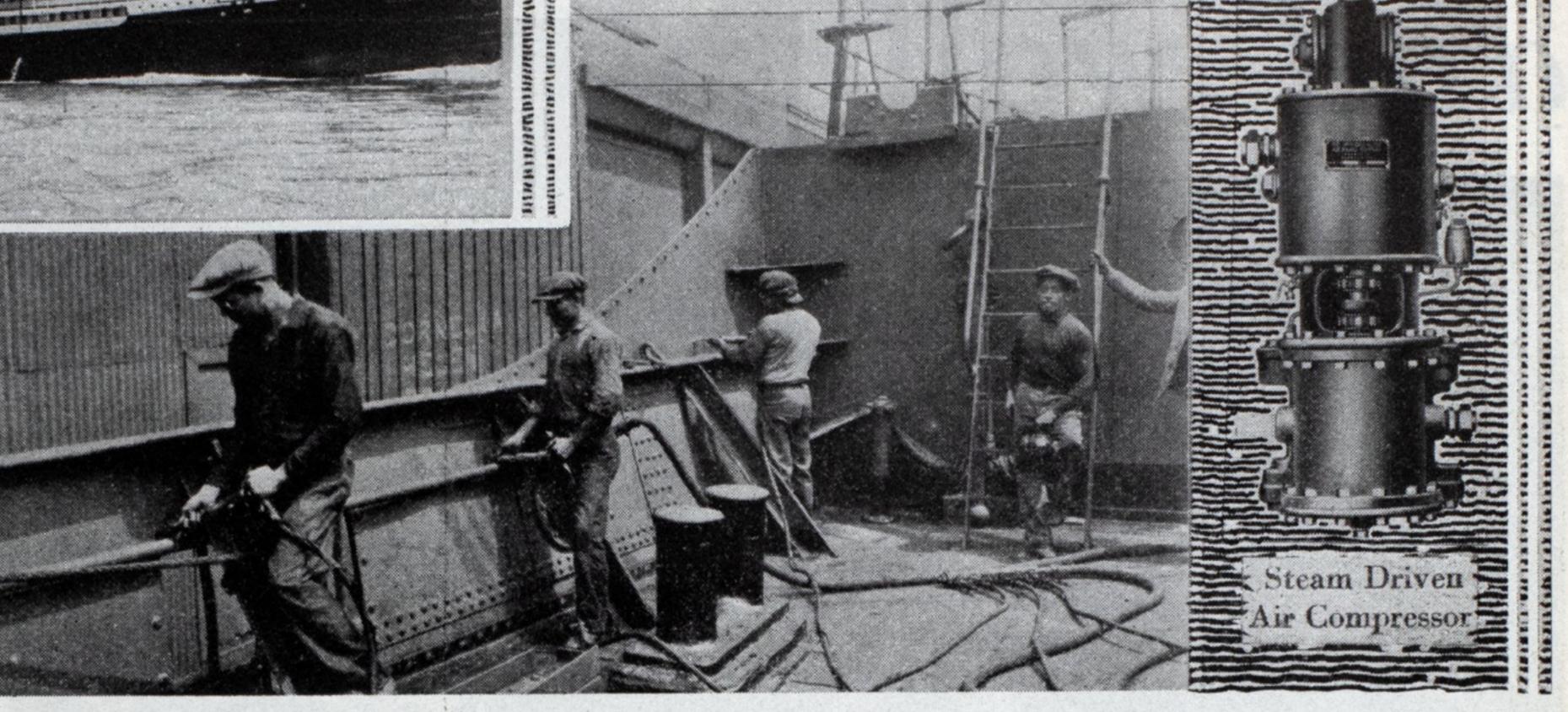
SUPERIOR Superior Shipbuilding Co.







One vessel of a large fleet equipped with Westinghouse Compressor



AIR COMPRESSORS for Marine Service

Westinghouse-National air compressors are used extensively in Marine Service—on yachts and motor boats to blow alarm whistles—on motor ships to startDiesel engines—on pile drivers, wrecking barges, etc., to operate wood-borers, saws, etc.—in lighthouses to furnish air for fog signals—in ship yards to operate pneumatic tools—and on steamships to supply air for cleaning boiler flues and machinery, and for operating scaling hammers and paint sprayers.

This latter use is of major importance. Formerly rust and scale were removed from the plates of a steel vessel by hand chippers and paint applied with a brush. The modern method—by compressed air—is quicker and better. Hundreds of air compressors have been applied to vessels for this purpose by

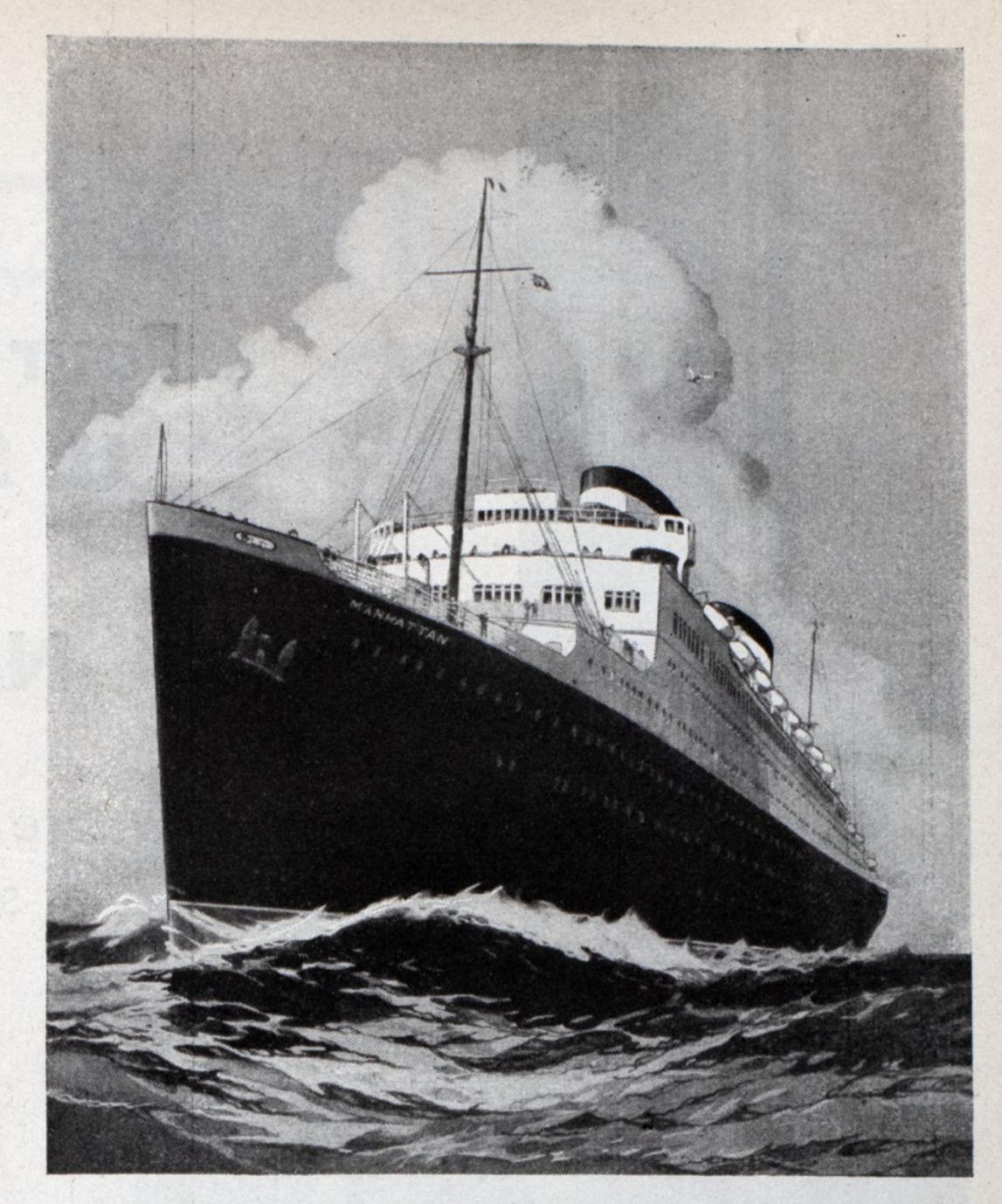
leading steamship companies, including the newly formed Baltimore Mail Steamship Company, the Atlantic Steamship Line, the Consolidation Navigation Company, the Merchants and Miners Transportation Company, and other lines operating from Gulf ports.

The compressor used almost universally for this purpose is the Westinghouse steamdriven type, the same as used on locomotives to supply air for brake operation. This machine is efficient, sturdy and reliable. It is compact and occupies no valuable floor space as it can be readily attached to a column or bulkhead . . . Every sea-going and coast-wise vessel should have one or more of these air compressors!

WESTINGHOUSE TRACTION BRAKE CO. Industrial Division - Pittsburgh, Pa.

MESTINGHOUSE-NATIONAL Air Compressors Cuality Machines for Quality Service

The Largest American Built Ship . . . and Modern Steam



The S. S. Manhattan

THE S. S. Manhattan, mighty express liner of the United States Lines and the largest ship ever built in America, will be assured of efficient and economical propulsion from Modern Steam at 400 pounds pressure and 670° F. total temperature.

Both this and a sister ship will be equipped with Babcock & Wilcox Express Type Marine Boilers, Air Heaters, Superheaters, Oil Burners, Desuperheaters, and will have furnaces lined with B. & W. No. 80 Firebrick . . . equipment built by a thoroughly trained and progressive organization with more than three decades of experience in the highly specialized engineering required for the solution of marine power problems.

BABCOCK & WILCOX

Marine Products

Water Tube Boilers

Superheaters

Economizers

Air Heaters

Stokers

Oil Burners

Refractories

Oil Separators

BABCOCK&WILCOX
BE LIBERTY ST. COMPANY NEW YORK, N.Y.

M-10

Four Panama Mail Liners U. S. Dredge "Raritan" and the New Giant Cunarder

are the latest additions to the long list of ships protected by the

STONE SYSTEM

FOR HYDRAULICALLY
CONTROLLING BULKHEAD DOORS

which is now available to the American Ship Owner direct from the American Locomotive Company.

For over 30 years this system has been protecting ships under practically all the flags of the world.

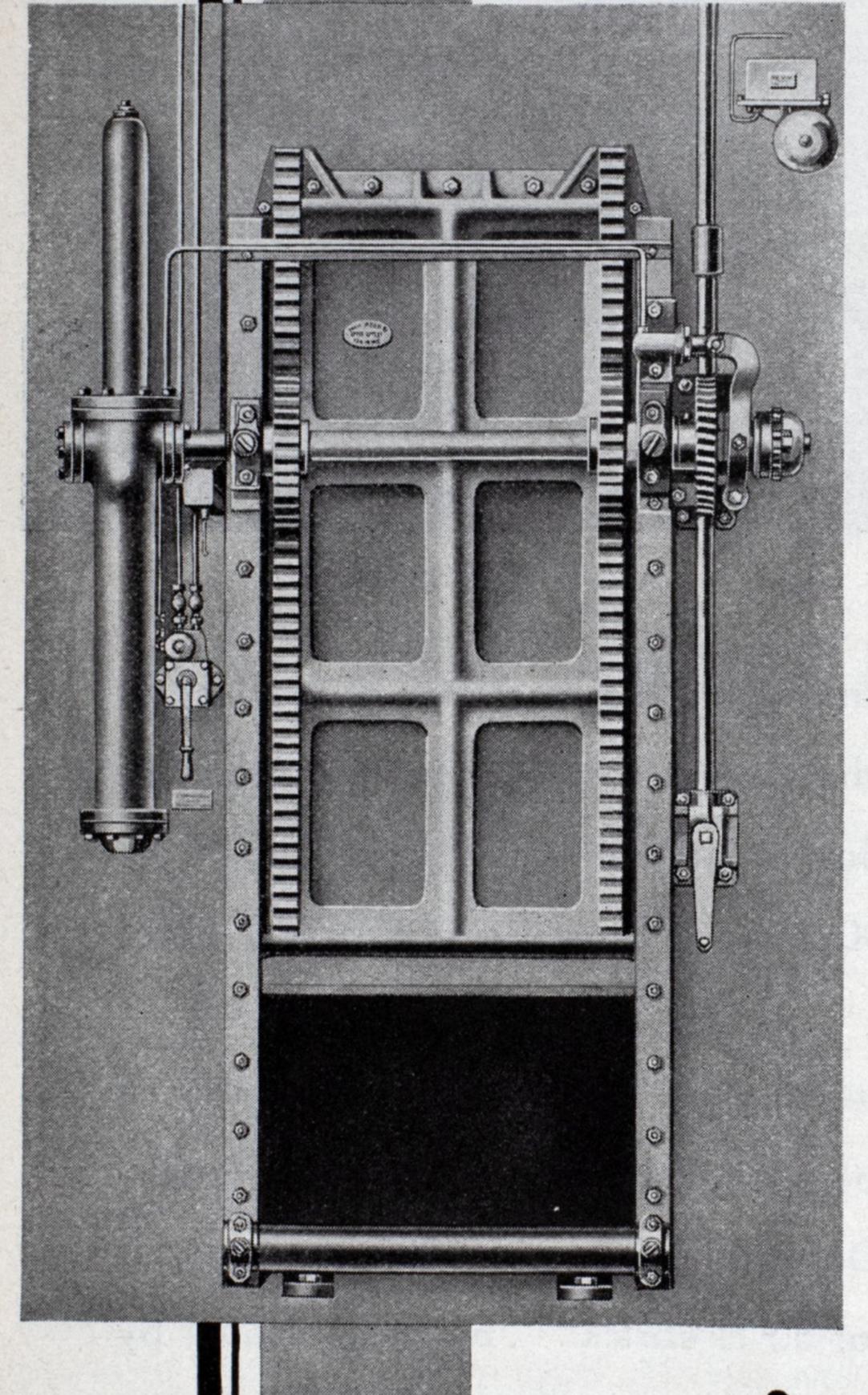
It has had many real severe sea tests.

Specify the Stone System and get proven safety.

At sea, Positive Safety is imperative.

AMERICAN LOCOMOTIVE CO.

30 CHURCH STREET, NEW YORK, N. Y. Rialto Building, San Francisco, Cal.



SAVE DOLLARS

with fast material-handling

It's the every-day performance of electric industrial trucks, equipped with Exide-Ironclads, that proves their economy

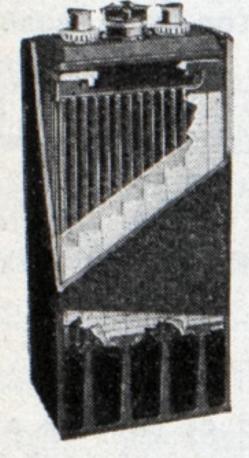
HERE'S one way to reduce production costs in your plant. Use electric industrial trucks powered by Exide-Ironclad Batteries, for all material-handling jobs possible.

Many large concerns throughout the United States have already proved that they save actual dollars this way. They

have found that electric trucks move material speedily, easily, and with economy. And give dependable, low-cost operation when powered by Exide-Ironclad Batteries.

It's the decidedly different construction of the Exide-Ironclad Battery that makes it give such reliable service with minimum care and attention . . . have such a long life . . . save owner's money.

Investigate the many dollar-saving advantages of having Exide-Ironclads do your handling jobs. Write for Bulletin, "Adaptability of Electric Industrial Trucks and Tractors." No obligation.



Exide-Ironclad cell cut away to show its moneysaving construction.

IT'S EASY, economical and fast ... handling material with electric industrial trucks powred by Exide-Ironclad Batteries. Ask those who use them. One Exide-Ironclad Battery, one sruck and one man, saved one firm \$7,000 in a 14-day period. (Confirming letter in our file.)



ELECTRIC STORAGE BATTERY COMPANY, Philadelphia THE THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto

Unless your warehouses are round-

YOU NEED THIS NEW E-P TRUCK TO HELP LOAD THE CORNERS!

WHIPPET-LIKE, this new truck snaps in and out of narrow aisles and tight corners, delivering loads at exactly the right places and "snugging them up" as it leaves.

This is the Elwell-Parker Truck, Type ERF, with telescoping uprights, three-wheel, short swing, light duty, fork-type, developed to handle light, bulky commodities. It is the newest "Junior" in our complete line, and it fully upholds Elwell-Parker standards and ideals.

Standardized unit parts, successfully used in other types of Elwell-Parker Trucks, simplify the design

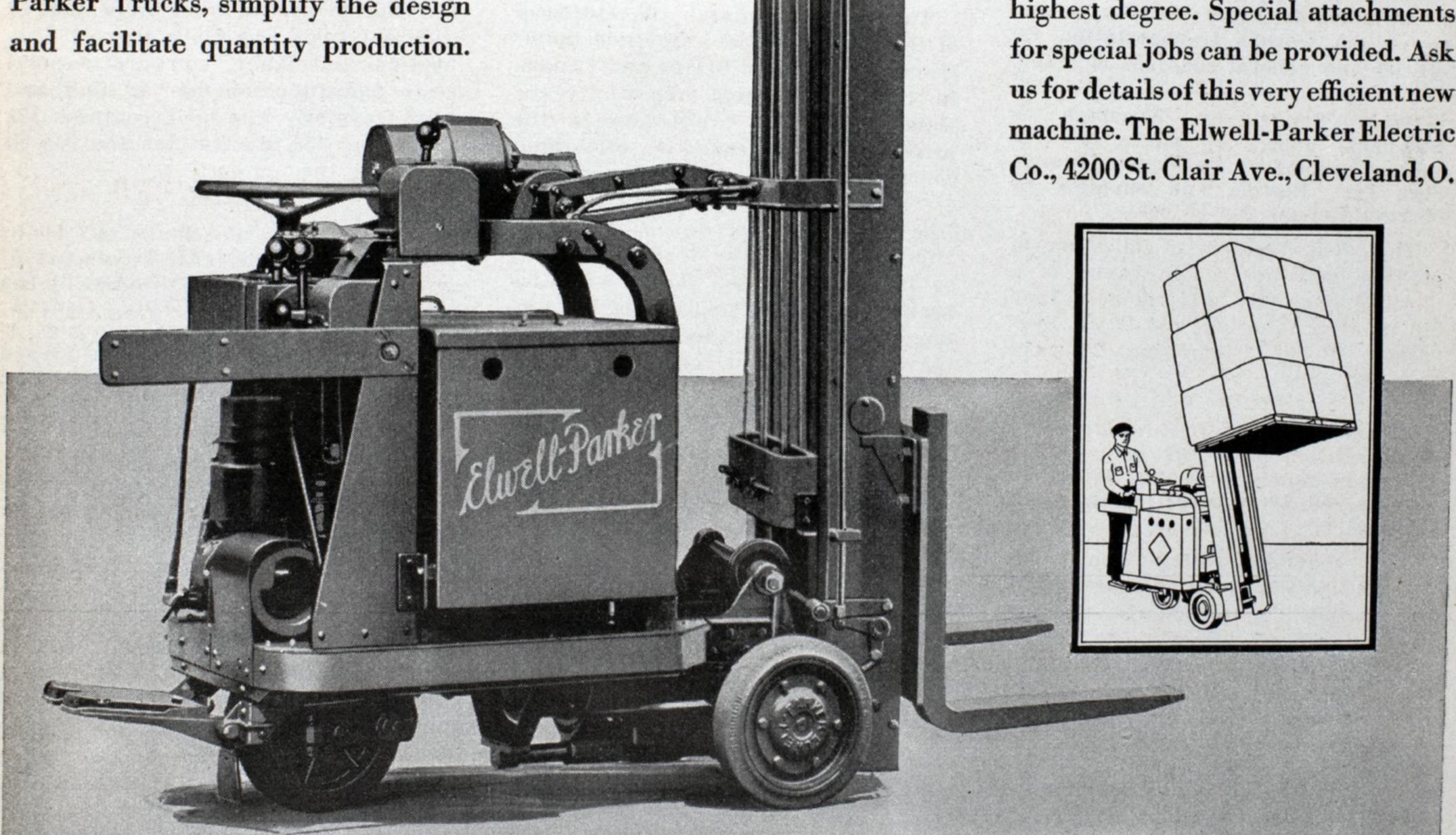
All the Elwell-Parker safety features have been retained and additional comforts such as back rest, rubber pedal pads and wheel steer have been provided for the operator.

Probably the most important buying reason today is the fact that two years ago Elwell-Parker set its Engineering Staff to the task of developing new ideas in truck design, sounding out future needs in freight

handling. We are now building these electric trucks-of which the ERF is one-that anticipate future conditions and make new economies in electric trucking available today.

The good faith of our Company is pledged in the statement that this latest development has brought to Elwell-Parker customers an even greater degree of forward-looking, money-saving improvement.

Like all other Elwell-Parker Trucks, Model ERF is extremely flexible-from your viewpoint, that means it is adaptable to your work in the highest degree. Special attachments for special jobs can be provided. Ask us for details of this very efficient new machine. The Elwell-Parker Electric Co., 4200 St. Clair Ave., Cleveland, O.



ELWELL-PARKER

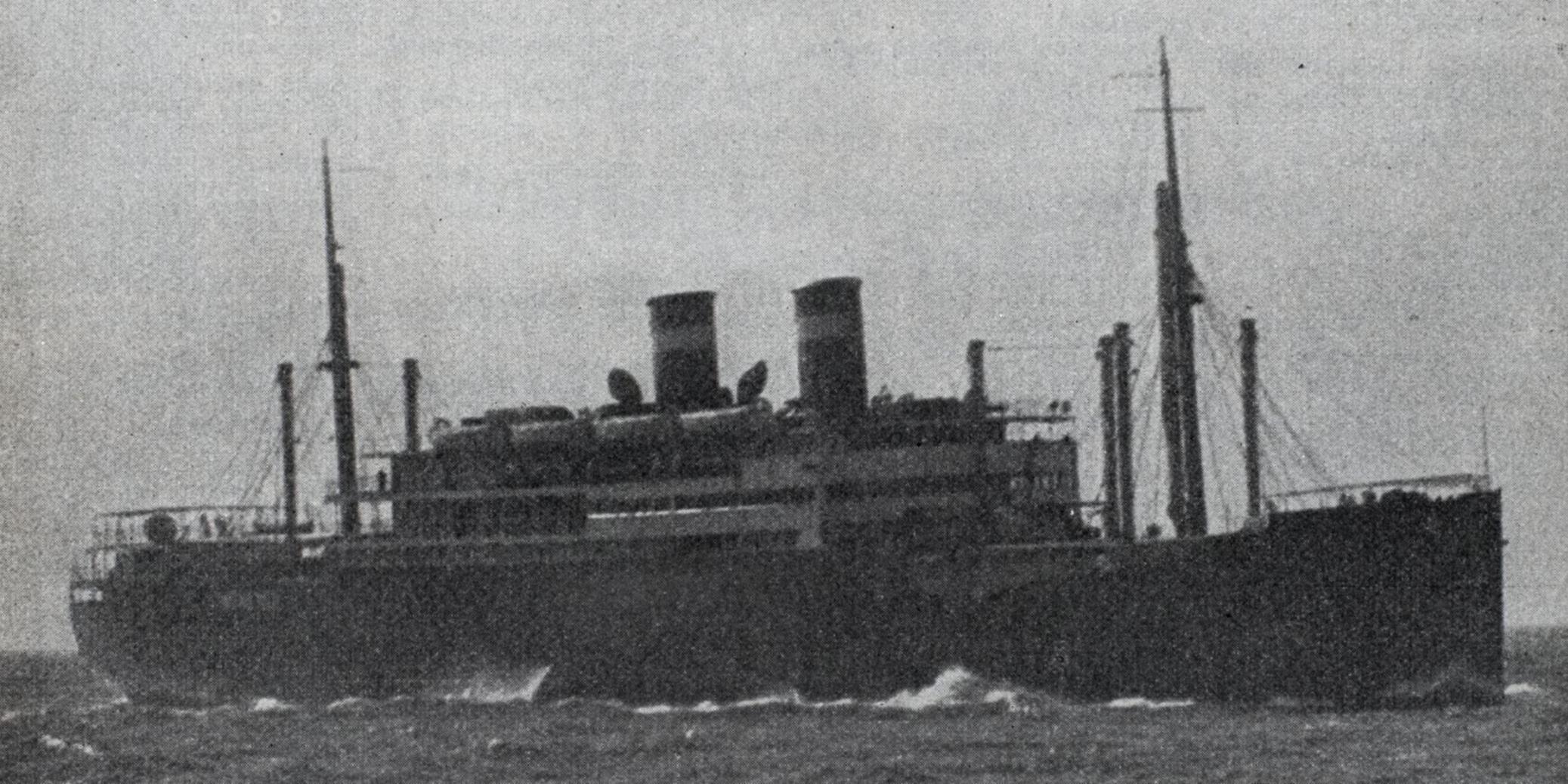
DESIGNERS AND BUILDERS OF ELECTRIC INDUSTRIAL TRUCKS, TRACTORS AND CRANES FOR OVER A QUARTER CENTURY

The AMERICAN MERCHANT MARINE

provides MORE THAN safe, speedy and economical transportation . . .

It is a vital force in the discovery and development of new markets . . . It helps to keep the wheels of industry turning and furnishes employment for many people.

It Merits Your Patronage



USE IT AND CONTRIBUTE
TO A NATIONAL PROSPERITY
THAT BENEFITS YOU

NEW YORK SHIPBUILDING COMPANY

Main Office and Yard: Camden, N. J. New York Office: 420 Lexington Avenue

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

AIR COMPRESSORS—See Compressors (Air)

AIR PREHEATERS
Babcock & Wilcox Co., The,
85 Liberty St., New York City.

ARMOR (Submarine)
Morse, Andrew J., & Son, Inc.,
221 High St., Boston, Mass.

BABBITT METAL
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

BARGES
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Newport News Shipbuilding & Dry
Dock Co., 90 Broad St.,
New York City.

BATTERIES
Electric Storage Battery Co., The,
19th and Allegheny Sts.,
Philadelphia.

BEARING (Rubber)
Goodrich, B. F., Rubber Co.,
Akron, O.

BINNACLES Ritchie, E. S., & Sons, Brookline, Mass.

BLOWERS (Flue)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.

BLOWERS (Turbine Driven)
Westinghouse Elec. & Mfg. Co.,
S. Philadelphia, Pa.

BOATS (Steel and Wood)

Bethlehem Shipbuilding Corp. Ltd.,

Bethlehem, Pa.

Newport News Shipbuilding & Dry

Dock Co., 90 Broad St.,

New York City.

BOILERS
Manitowoc Shipbuilding Corp.,

Manitowoc, Wis.

BOILERS (Marine)
Almy Water Tube Boiler Co.,
184 Allen St., Providence, R. I.
American Shipbuilding Co.,
Foot of W. 54th St. Cleveland

Babcock & Wilcox Co.,

85 Liberty St., New York City.

Bethlehem Shipbuilding Corp. Ltd.,

Bethlehem, Pa.

Newport News Shipbuilding & Dry

Dock Co., 90 Broad St.,

New York City.

Oldman-Magee Boiler Works, Inc.,
36-40 Illinois St., Buffalo, N. Y.

Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.

BOILERS (Water Tube)
Almy Water Tube Boiler Co.,
184 Allen St., Providence, R. I.
Babcock & Wilcox Co., The,
85 Liberty St., New York City.

BOOKS (Technical)
Penton Publishing Co., Cleveland, O.

**Iler-Hammer, Inc.,

**165 St. Paul Avenue,

-'ilwaukee. Wis.

**Ilwaukee. Wis.

**Bland & Cornelius.

Marine Trust Bldg., Buffalo, N. Y.

BUNKER FUEL OIL—See FUEL OIL

BRAKES (Electric)

BURNERS (Oil)—See OIL BURNING EQUIPMENT

CABLES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co.,
46 South St., New York City.

CALKING COTTON
Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

FEED WATER HEATERS—See HEATERS AND PURIFIERS (Feed Water)

CAPSTANS
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.

CAR FLOATS
American Bridge Co.,
Frick Bldg.. Pittsburgh, Pa.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.

CASTINGS
Newport News Shipbuilding & Dry
Dock Co., 90 Broad St.,
New York City.

COMPASSES
Ritchie, E. S., & Sons,
Brookline, Mass.

COMPASSES (Gyro)
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

COMPRESSORS (Air)
Westinghouse Air Brake Co.,
Wilmerding, Pa.

CONDENSERS
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

CONTROLLERS (Electric) Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

CORDAGE
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works,
Boston, Mass.
Whitlock Cordage Co.,
46 South St., New York City.

Foot of W. 54th St., Cleveland, O. DIESEL ENGINES—See ENGINES abcock & Wilcox Co., (Diesel)

DIESEL FUEL OIL—See FUEL

DISTILLING APPARATUS
Griscom-Russell Co.,
285 Madison Ave., New York City.

Morse, Andrew J., & Son, Inc., 221 High St., Boston, Mass.

DRAFT (Artificial and Mechanical for Boilers) American Shipbuilding Co., Foot of W. 54th St., Cleveland.

DREDGING MACHINERY
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

DRY DOCKS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Manitowoc Shipbuilding Corp.,
Manitowoc Shipbuilding Corp.,

Manitowoc, Wis.

Newport News Shipbuilding & Dry

Dock Co., 90 Broad St.,

New York City.

New York Shipbuilding Co.,

Camden, N. J.

Sun Shipbuilding & Dry Dock Co., Chester, Pa. Todd Shipyards Corp., 25 Broadway, New York City. DYNAMOS
General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

ECONOMIZERS

Babcock & Wilcox Co., The,

85 Liberty St., New York City.

EJECTORS (Ash)

Westinghouse Electric & Mfg. Co.,

So. Philadelphia, Pa.

ENGINE SPEED INDICATORS
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

ENGINEERS (Marine, Mechanical and Consulting) Todd Shipyards Corp., 25 Broadway, New York City.

ENGINES

Manitowoc Shipbuilding Corp.,

Manitowoc, Wis.

Sun Shipbuilding & Dry Dock Co.,

Chester, Pa.

ENGINES (Diesel)
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.

ENGINES (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp. Ltd.,
Bethlehem, Pa.
Newport News Shipbuilding & Dry
Dock Co., 90 Broad St.,
New York City.
New York Shipbuilding Co.,

Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.

ENGINES (Oil)
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.

ENGINES (Vertical, Enclosed, Self Oiling) Troy Engine & Machine Co., Troy, Pa.

EUROPEAN STEAMSHIP LINES (Passenger and Freight) Hamburg-American Line, 39 Broadway, New York City.

EVAPORATORS
Griscom-Russell Co.,
285 Madison Ave., New York City.

FANS Diehl Mfg. Co., Elizabethport, N. J.

FANS (Electric)
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

FEED WATER REGULATORS
Babcock & Wilcox Co.,
85 Liberty St., New York City.

FIRE BRICK
Babcock & Wilcox Co., The,
85 Liberty St., New York City.

FLOOR PLATES
Carnegie Steel Co.,
Carnegie Bldg., Pittsburgh, Pa.

FOUNDERS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
New York Shipbuilding Co.,
Camden, N. J.

FREIGHT SERVICE
Hamburg-American Line,
39 Broadway, New York City.

FUEL OIL Vacuum Oil Co., 61 Broadway, New York City.

GAGES (Water)
Jerguson Gage & Valve Co.,
Somerville, Mass.

GEARS (Electric)
General Electric Co.,
Schenectady, N. Y.

GEARS (Marine Equipment)
Westinghouse Electric & Mfg. Co.,
So. Philadelphia. Pa.

GENERATING SETS
General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.

GENERATING SETS (Direct Connected)
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

GENERATORS
Diehl Mfg. Co.,
Elizabethport, N. J.
General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

GOVERNORS
Cory, Chas., Corp.,
754-70 Lexington Ave., Brooklyn,
N. Y.

GREASE Vacuum Oil Co., 61 Broadway, New York City.

GREASE (Launching)
Vacuum Oil Co.,
61 Broadway, New York City.

GYRO-PILOT (Automatic Steering)
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

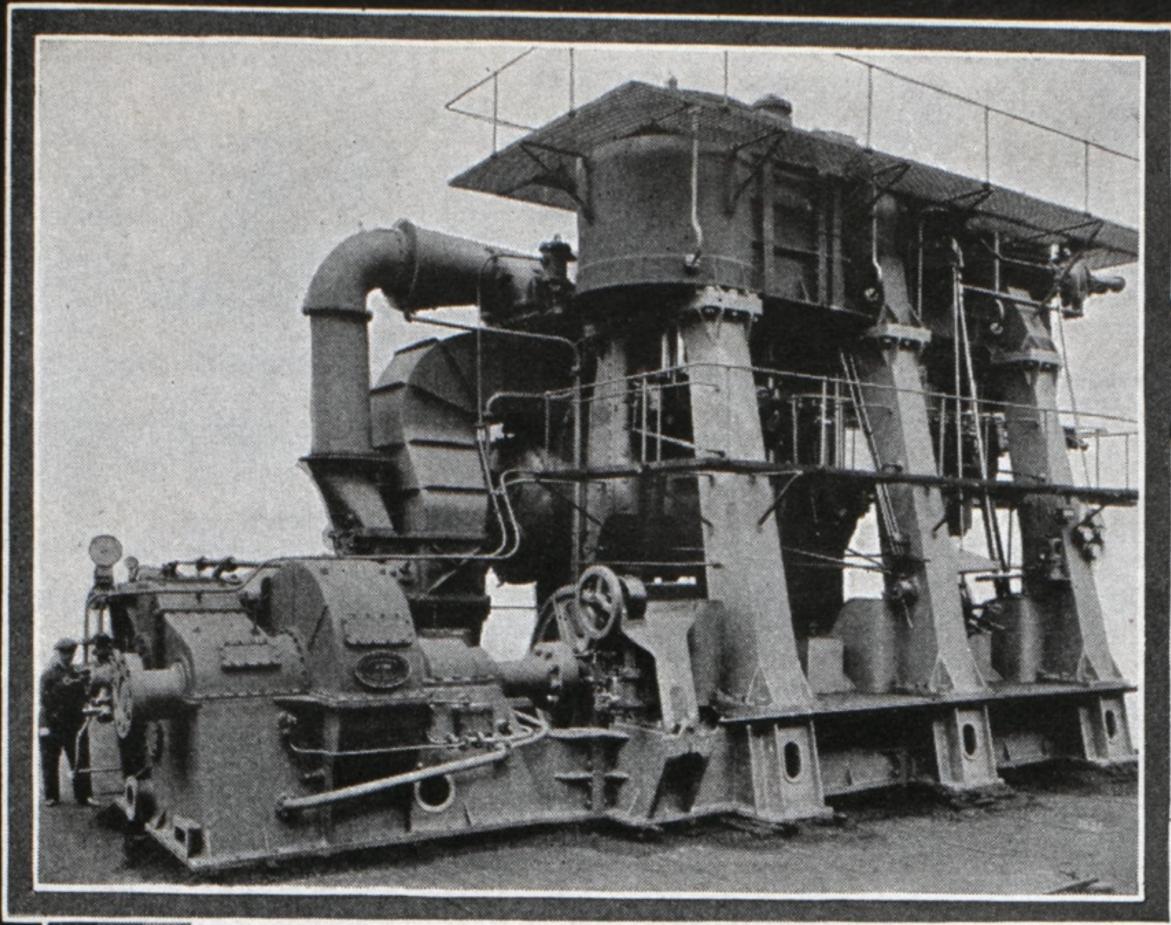
HATCH COVERS (Steel)
MacGregor & King, Ltd., 5 Lloyd's
Ave., London, E.C.3, Eng.

HAWSERS (Manila)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co.,
46 South St., New York City.

HEATERS (Electric)
Superior Mfg. Co., The,
Gregg St., Carnegie, Pa.

HEATERS AND PURIFIERS
(Feed Water)
Davis Engineering Co.,
90 West St., New York City.
Griscom-Russell Co.,
285 Madison Ave., New York City.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

HEATING EQUIPMENT
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.



Siprocating Keigines Made ECONOMICAL

A DE LAVAL EXHAUST TURBINE installed to supplement a piston engine, in accordance with the Bauer-Wach System, will increase the power 20 to 25%, or decrease the fuel consumption for equal power by a like amount.

Greater speed, more trips, and greater yearly earnings can be made without changing the existing boiler plant or burning more fuel.

References can be given to over 800,000 H. P. in successful service.

De Laval Steam Turbine Co., Trenton, New Jersey



LURLINE MARIPOSA MONTEREY

On Outstanding Ships...

And now on the new Matson liners—Paracoil Equipment. Outstanding American built ships are generally Paracoil equipped. Leading fleet owners have proved the value of this equipment by its past performance. Therefore, on their new ships it is Paracoil without question.

Paracoil includes evaporators, lubricating oil coolers, feed water heaters (standard and improved) distillers, oil heaters, water heaters, etc., etc.

Write for bulletins.

DAVIS ENGINEERING CORP.

90 West Street

Factory: Elizabeth, N. J.



HAMBURG-AMERICAN LINE

Passenger Services: New York to Cherbourg, Southampton and Hamburg. New York to Galway, Cobh (Queenstown), Cherbourg and Hamburg. North Pacific Ports to Hamburg, Bremen and Antwerp via Panama Canal.

Pleasure Cruises: Around the world, to the West Indies, to Northern Wonderlands.

Freight Services: New York to Hamburg (8 days). Boston, Philadelphia, Baltimore and Norfolk to Bremen and Hamburg.

North Pacific Ports direct to Hamburg, Bremen and Antwerp.

HAMBURG-AMERICAN LINE

39 Broadway

New York



A complete line of structural steel sections for shipbuilding purposes, including Carnegie Beams with their wide, parallel flanges, shipbuilding channels and bulb angles, Carnegie Floor Plate in a raised pattern insuring long wear and easy cleaning, and rolled steel plates of every description.

The name "Carnegie" has been identified with steel manufacture for nearly three-quarters of a century—a good name to look for on Steel.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

64

HOISTING ENGINES Hyde Windlass Co., Bath, Me.

HOISTS (Air) American Shipbuilding Co., Foot of W. 54th St., Cleveland.

INDICATORS (Direction & Revolution) Cory, Chas., Corp., 754-70 Lexington Ave., Brooklyn, N. Y. Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

INDICATORS (Helm Angle) Cory, Chas., Corp., 754-70 Lexington Ave., Brooklyn, N. Y. Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

INDICATORS (Speed) Cory, Chas., Corp., 754-70 Lexington Ave., Brooklyn, N. Y. Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

INSURANCE (Marine) Boland & Cornelius, Marine Trust Bldg., Buffalo, N. Y.

LAMPS (Mazda and Arc) General Electric Co., Schenectady, N. Y.

LIGHTING EQUIPMENT Cory, Chas., Corp., 754-70 Lexington Ave., Brooklyn, N. Y. General Electric Co., Schenectady, N. Y. Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

LUBRICATING OIL Vacuum Oil Co., 61 Broadway, New York City.

MACHINERY (Marine) American Shipbuilding Co., Foot of W. 54th St., Cleveland, O. Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa. Manitowoc Shipbuilding Corp., Manitowoc, Wis.

MACHINISTS American Shipbuilding Co., Foot of W. 54th St., Cleveland, O. New York Shipbuilding Co., Camden, N. J.

MAGNETS (Lifting) Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

MANILA OAKUM-See OAKUM (Marine, Rope, Packings, Plumbers)

METERS (Gas & Air) Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

MOTOR GENERATOR SETS General Electric Co., Schenectady, N. Y. Troy Engine & Machine Co., Troy, Pa. Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

MOTORS Dienl Mfg. Co., Elizabethport, N. J.

MOTORS (Electric) General Electric Co., Schenectady, N. Y. Troy Engine & Machine Co., Troy, Pa. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS Ritchie. E. S., & Sons, Brookline, Mass. Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

NAVIGATING INSTRUMENTS White, Kelvin & Wilfrid O., Co., 112 State St., Boston, Mass.

OAKUM (Marine, Rope, Packing, Plumbago) Stratford, Geo., Cakum Co., 120 Montgomery St., Jersey City, N. J.

OIL BURNING EQUIPMENT Babcock & Wilcox Co., 85 Liberty St., New York City. Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa. Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.

OIL FOR ALL PURPOSES (Marine) Vacuum Oil Co., 61 Broadway, New York City.

PACKING SERVICE Export Fibreboard Case Assoc., 155 Montgomery St., San Francisco, Cal.

PACKING CASES (Fibreboard) Export Fibreboard Case Assoc., 155 Montgomery St., San Francisco, Cal.

PASSENGER SERVICE Hamburg-American Line, 39 Broadway, New York City.

POWDERED COAL BURNERS Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.

PROPELLER BLADES AND HUBS Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS American Shipbuilding Co., Foot of W. 54th St., Cleveland, O. Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City. Reading, E. H., 226 Ohio St., Buffalo, N. Y. Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLERS Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa. Hyde Windlass Co., Bath, Me. Newport News Shipbuilding & Dry-Dock Co., 90 Broad St., New York City.

PULVERIZED COAL BURNERS Todd Shipyards Corp., 25 Broadway, New York City.

PULVERIZED COAL SYSTEMS Todd Shipyards Corp. 25 Broadway, New York City.

PUMPS Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

PUMPS (Ballast) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

PUMPS (Bilge) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

PUMPS (Boiler Feed) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

PUMPS (Direct Acting) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

PUMPS (Fuel Oil) Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal. PUMPS (Power)

Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind. PUMPS (Steam) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind. PUMPS (Vacuum)

Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind. PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

REPAIRS (Electric) General Electric Co., Schenectady, N. Y. Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

REPAIRS (Marine) American Shipbuilding Co., Foot of W. 54th St., Cleveland. Bethlehem Shipbuilding Corp. Ltd., Hyde Windlass Co., Bath, Me. Bethlehem, Pa. Chicago Shipbuilding Co., So. Chicago, Ill. Manitowoc Ship Building Corp., Manitowoc, Wis.

Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City. New York Shipbuilding Co., Camden, N. J.

Chester, Pa. Todd Shipyards Corp., 25 Broadway, New York City. REPAIRS (Turbine) General Electric Co., Schenectady, N. Y. Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

REVOLUTION COUNTERS Sperry Gyroscope Co., Brooklyn, N. Y.

ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage) Columbian Rope Co., Auburn, N. Y. Samson Cordage Works, Boston. Whitlock Cordage Co., 46 South St., New York City.

ROPE (Transmission) Columbian Rope Co., Auburn, N. Y.

ROPE OAKUM Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

RUST PREVENTATIVE (Oil) Vacuum Oil Co., 61 Broadway, New York City.

SAFETY VALVES (Marine) Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary) American Shipbuilding Co., Foot of W. 54th St., Cleveland.

SEARCHLIGHTS General Electric Co., Schenectady, N. Y.

SEARCHLIGHTS (High Intensity) Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc) Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

SEPARATORS (Oil) Babcock & Wilcox Co., 85 Liberty St., New York City. Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa.

SHIPBUILDERS American Shipbuilding Co., Foot of W. 54th St., Cleveland. Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa. Manitowoc Ship Building Corp., Manitowoc, Wis. Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.

New York Shipbuilding Co., Camden, N. J. Sun Shipbuilding & Dry Dock Co., Chester, Pa. Fodd Shipyards Corp., 25 Broadway, New York City.

SHIP STABILIZERS Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

SPUN OAKUM Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

STEAMSHIP LINES (Passenger and Freight) Hamburg-American Lines, 39 Broadway, New York City.

STEAM GAGES Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

STEAM TRAPS Davis Engineering Co., 90 W st St., New York City.

STEEL BARGES—See BARGES (Steel)

STEERING ENGINES

STEERING GEARS American Shipbuilding Co., Foot of W. 54th St., Cleveland. Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa. Hyde Windlass Co., Bath, Me.

STOKERS Babcock & Wilcox Co., The. Sun Shipbuilding & Dry Dock Co., 85 Liberty St., New York City.

STORAGE BATTERIES-See BATTERIES

STRAINERS (Oil) Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.

SUPERHEATERS Babcock & Wilcox Co., The, 85 Liberty St., New York City.

SWITCHBOARDS General Electric Co., Schenectady, N. Y. Troy Engine & Machine Co., Troy, Pa. Westinghouse Electric & Mfg. Co., S. Philadelphia. Pa

TELEGRAPH (Electrical, Mechanical) Cory, Chas., Corp., 754-70 Lexington Ave., Brooklyn, N. Y.

TELEMOTORS Hyde Windlass Co., Bath, Me.

TELEPHONE SYSTEMS Cory. Chas., Corp. 754-70 Lexington Ave., Brooklyn, N. Y.

TOWING LINES Columbian Rope Co., Auburn, N. Y. Whitlock Cordage Co., 46 South St., New York City.

TRACTORS Elwell-Parker Electric Co., The, 4205 St. Clair Ave. Cleveland, O.

TRANSMISSION (Rope)—See ROPE (Transmission)

TRUCKS Elwell-Parker Electric Co., The, 4205 St. Clair Ave. Cleveland, O.

TURBINES (Electric) Westinghouse Electric & Mfg. Co., So. Philadelphia. Pa

TURBINES (Marine) Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa. General Electric Co. Schenectady. N. Y. Newport News Shiphuilding & Dry Dock Co., 90 Broad St., New York City Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa

TURBINES (Steam) DeLaval Steam Turbine Co. Trenton, N. J. General Electric Co.. Schenectady, N. Y. Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City. Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TWINE AND ROPE Columbian Rope Co., Auburn. N. Y. Samson Cordage W rla Boston. Whitlock Cordage Co. 46 South St., New York City.

WATER COOLERS General Electric Co.. Schenectady, N. V.

WATER PURIFICATION SYSTEMS Griscom-Russell Co., 285 Madison Ave. New York City.

WELDERS (Electric Arc) General Electric Co. Schenectady, N. Y Westinghouse Electric & Mfg. Co., S. Philadelphia. Pa

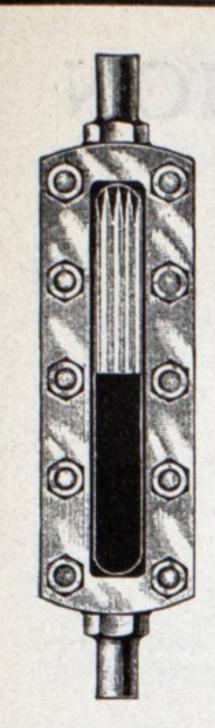
WHISTLES Star Brass Mfg. Co., 53 Oliver St. Boston Mass.

WINCHES Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa. Dake Engine Co. Grand Haven. Mich Hyde Windlass Co., Bath, Me.

WINDLASSES American Shipbuild no Co. Foot of W 51th St. Cleveland. Bethlehem Shipbuilding Corp. Ltd., Bethlehem, Pa. Hyde Windlass Co. Rath, Me.

WINDOWS (Balanced Frameless) Kearfoot Engineering Co. 117 Liberty St. New York City.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above



REFLEX WATER GAGES

Used on all types of boilers by all the Principal Navies of the world

"The Water Shows Black"

ADVANTAGES: Quick and reliable observation of the water level. Safe, sure and durable at high pressure. Not affected by cold air drafts. Most effective protection against injuries to boilers and workmen. Easily applied to all types of gage glass fittings.

When filled with WATER the Reflex Gage always appears BLACK. When empty it instantly shows WHITE. No mistake possible. This feature alone is worth many times the cost of the Reflex.

Send for catalog of Water Gage Apparatus

MANUFACTURED BY THE **JERGUSON** GAGE & VALVE CO.

WINTER HILL, SOMERVILLE, MASS.

Kelvin & Wilfrid O. White Co. 112 State Street, Boston

> Ship Compasses Navigational Equipment Contracts a Specialty New York and Montreal

John J. Boland

Adam E. Cornelius

BOLAND & CORNELIUS

VESSEL OWNERS AND BROKERS Marine Insurance Agents

Marine Trust Building BUFFALO, N. Y.

DEAN BROS.

MARINE PUMPS

"The Dean of Pumps on Land and Sea"

Single Style & Duplex Piston Type & Plunger

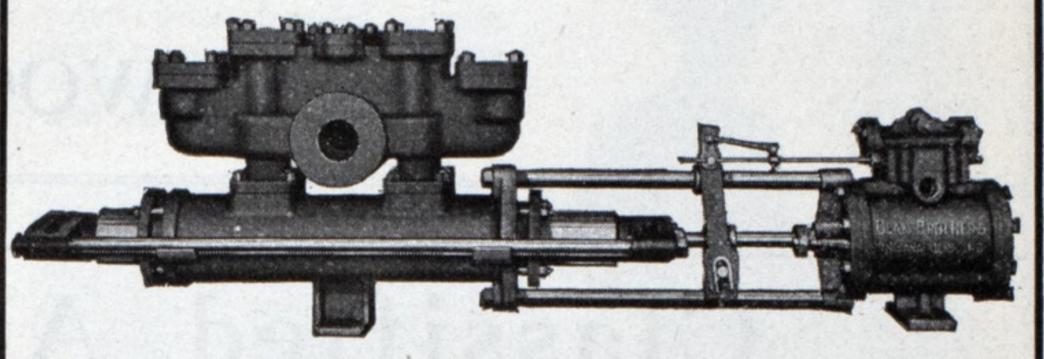


Figure No. 2311 Horizontal Single Style Double Acting Outside End Packed Plunger Trombone Pot Valve Pump For Boiler Feed & Pressure Service.

ESTABLISHED 1869

DEAN BROS. COMPANY

MANUFACTURERS OF PUMPING MACHINERY FOR ALL PURPOSES

323 WEST TENTH ST.

|NDIANAPOLIS |ND.

GRISCOM-RUSSELL



Evaporators-Feed Water Heaters-Extraction Steam Heaters-Generator Air Coolers-Lubricating Oil Coolers-Steam, Air and Oil Separators - Filters - Strainers-Expansion Joints Described in bulletins which will be sent on request

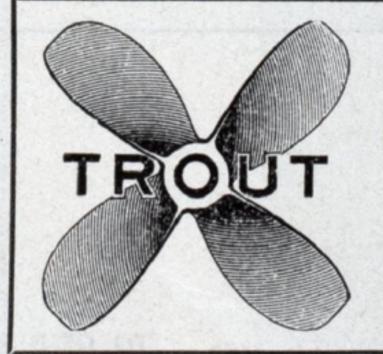
THE GRISCOM-RUSSELL COMPANY 285 Madison Avenue, NEW YORK CHICAGO: 20 North Wacker Drive



Propeller Wheels Blades

to fit any hub. Sheriffs Manufacturing Established 1854

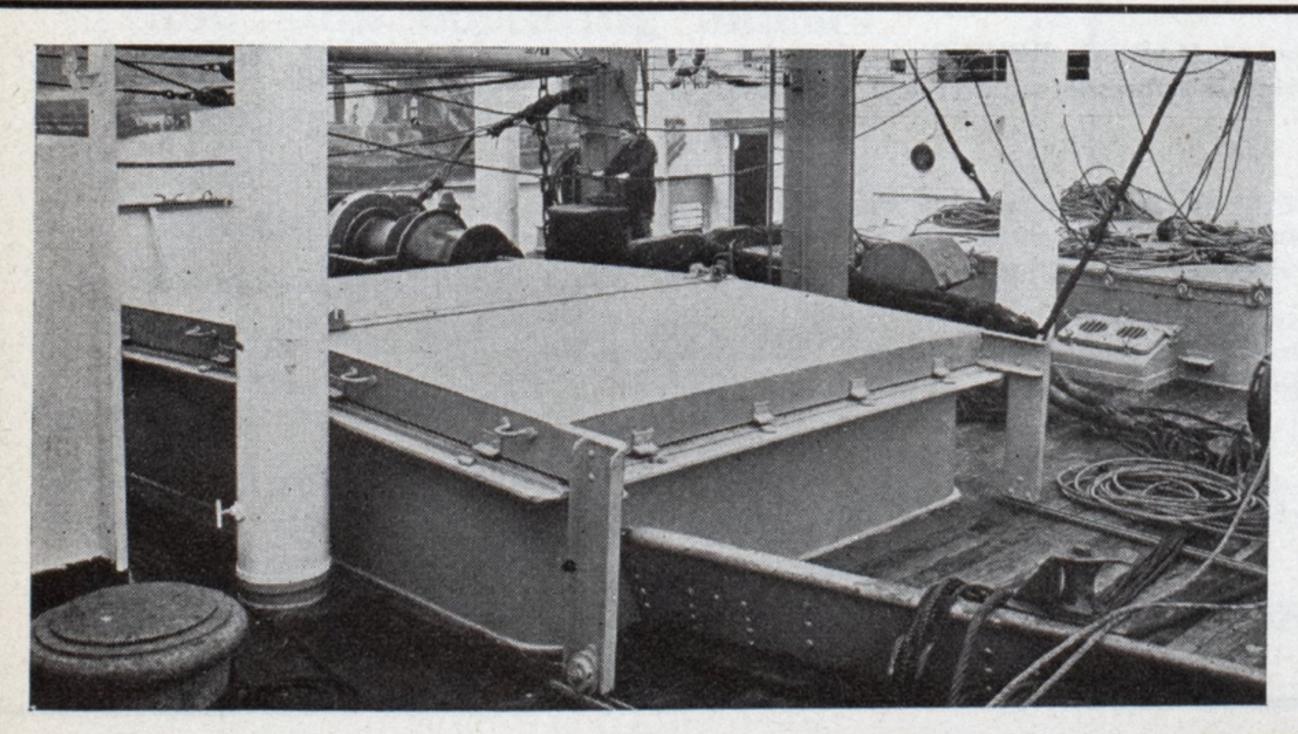
Milwaukee. Wis.



E. H. READING PROPELLER WHEELS

Machinery Repairs 226 Ohio St.

BUFFALO, N.Y.



"MACANKING" STEEL HATCH COVERS

Web beams, wood hatches and tarpaulins are economically obsolete as well as insecure, and no amount of tinkering with such an antiquated method of hatch covering can put it right.

"Macanking" Steel Hatch Covers result in saving of Time in Port and increased Safety at Sea, while experience has proved that upkeep and renewal costs are eliminated.

MACGREGOR & KING, LTD. 5. LLOYD'S AVENUE, LONDON, E.C. 3., ENGLAND

MANITOWOC SHIPBUILDING CORPORATION

Designers and builders of steel passenger and freight vessels, oil tankers, carferries, self unloaders, sand suckers, yachts, dredges, derricks, barges, scows, fire boats, lighters, tugs, marine engines, marine boilers, etc.

Excellent dry docking facilities for quick and economical

repairs.

MANITOWOC, WISCONSIN

Classified Advertisements

For Sale

FOR SALE WOODEN TOW BARGE N. C. HOLLAND

187' Keel 32' Beam 11' 2" Depth.
O. W. Blodgett, Bay City, Mich.

STEAM CAPSTAN, PRACTICALLY NEW, suitable for towboat or barge at a Bargain—Apply East Jersey Railroad and Terminal Co., 17 Battery Place, New York City.

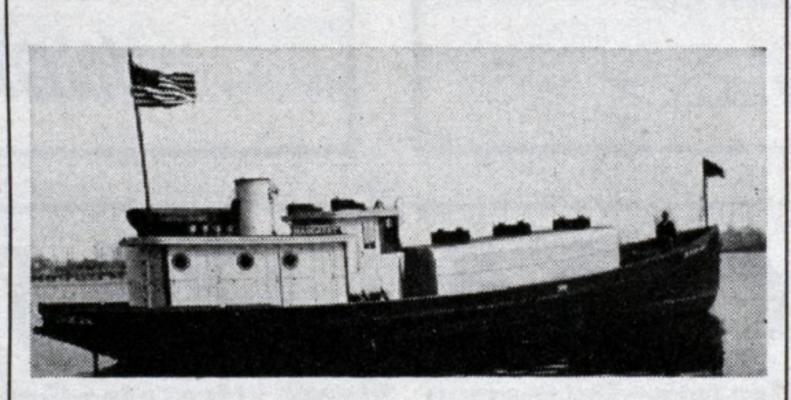
Help Wanted

SALESMEN WANTED IN VARIOUS SECtions of the country to sell established complete line of Paint Brushes. Liberal commissions. David Linzer & Sons, 102-0 Astor Place, New York City.

For Sale

FOR SALE AT AUCTION

NOVEMBER 17TH, 1931. Steamer Mathew Wilson. Now at North Tonawanda, N. Y. For any further information, inquire Kreetan Company, North Tonawanda, N. Y.



FOR SALE: JUST COMPLETED OIL TANK delivery boat Margaret, 24,500 gal. capacity, six compartments driven by 100 H.P. Fairbanks Morse Semi Diesel Engine. If interested write E. L. Taylor, 2712 Chesterfield Blvd., Norfolk, Va.

For Sale

FOR SALE SIDE WHEEL STR. GREYHOUND

Length 286'—beam—overall 68' Beam hull 36'—Capacity 2800 passengers. For price, photo and full particulars address

GEO. E. HARDY 703 Madison Ave. Toledo, Chio

FOR SALE WOODEN TOW BARGE PESHTIGO

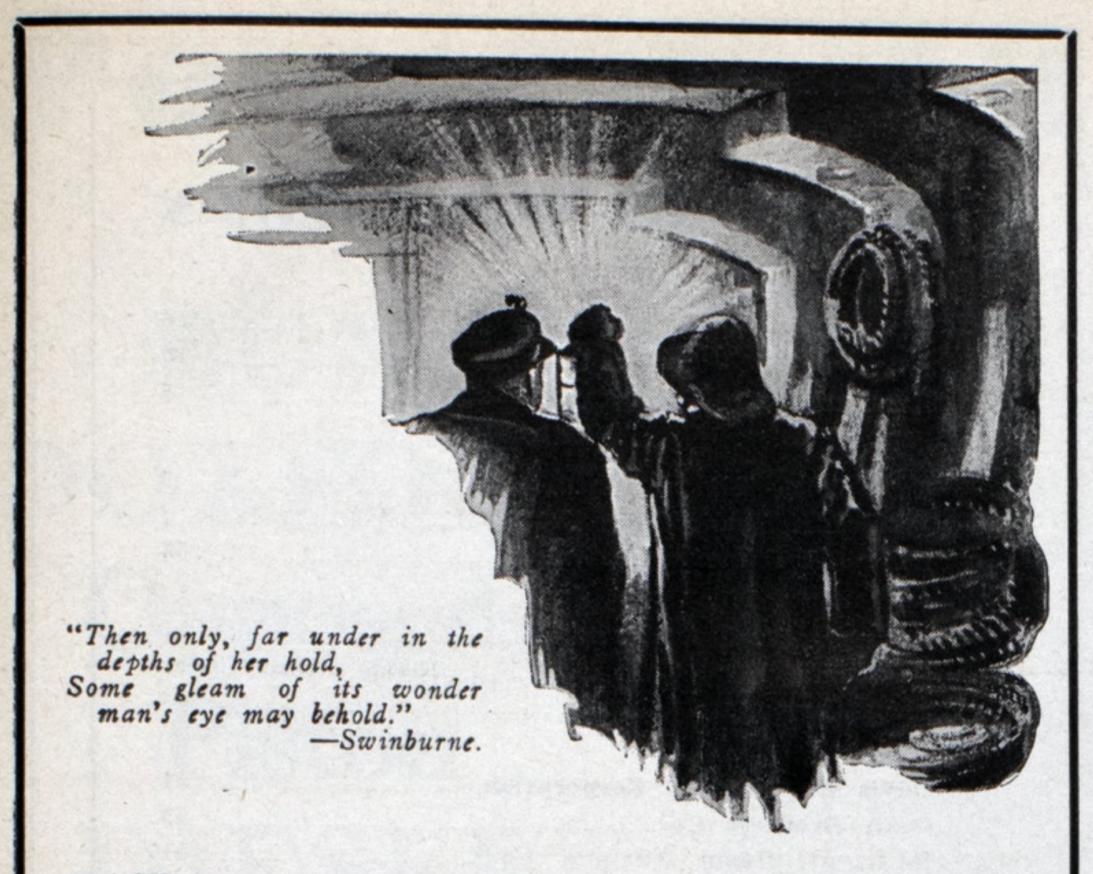
201' Keel 37' Beam 12' Depth.
O. W. Blodgett, Bay City, Mich.

TO OUR SUBSCRIBERS

The classified section of MARINE REVIEW is for your convenience—its value is proving worthwhile to everyone who uses it to buy and sell.

If you want to buy or sell ships or marine equipment—need a man for your organization—make it known to the entire marine industry through the use of classified advertising in MARINE REVIEW.

Mail copy for your advertisement in the January issue today, so it reaches us before December 20.



EACH beam, each well fitted timber, each sturdy rib and plank strong enough to stand the wildest gale,—and she's tight if properly caulked.

The experienced sailor knows the value of tight seams—no one need tell him that—but thousands of ships on the seven seas assure him that his seams will be tighest when caulked with

STRATFORD DAKUM

For almost a century Stratford Oakum has caulked the seams of the finest vessels that sail the seas. Be sure you get genuine Stratford Oakum. There is no other "just as good."

George Stratford Oakum Company

JERSEY CITY, NEW JERSEY

Also manufacturers of Cotton Wiping Waste

*3



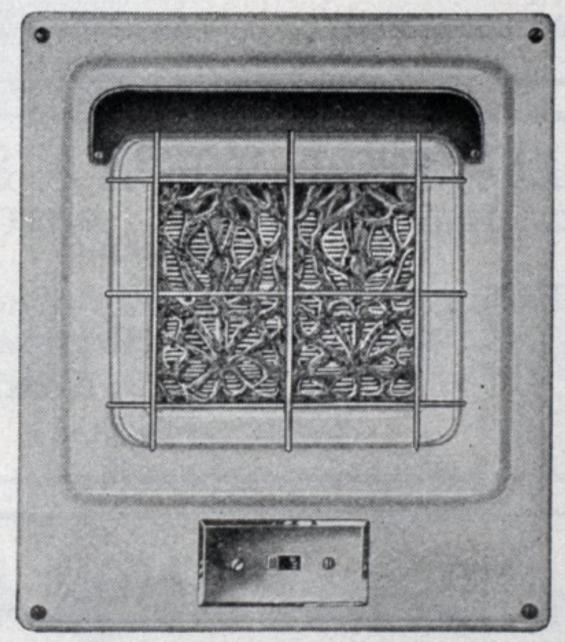
PLAN NOW

The marine industry is of tremendous importance as a market for your products and service.

Marine Review can assist you in securing better sales returns. It is subscribed for bymore steamship executives and ship operating officers than any other marine publication. Further, Marine Review gives you complete coverage of the shipyards as virtually every one of them subscribe for one or more copies.

Be sure to include Marine Review in your sales and advertising plans to reach the really important men who say yes, and O. K. requisitions in the marine trade.

INSTANT HEAT ALWAYS READY



Model 102A Volts Rating 110 1000 Watts Dimensions

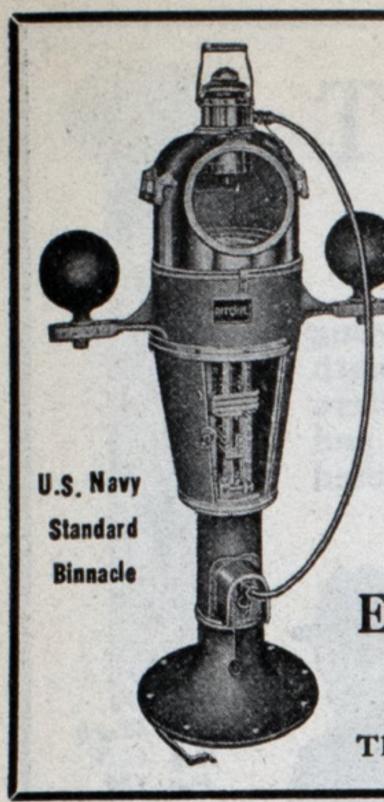
Frame: 14" Wide 16¼" High Body: 11¾" Wide 11¾" High 4" Deep Finishes—White, Ivory, Green and Orchid Requires No. 12 Wire for connection.

At a snap of the switch your passengers can heat their staterooms to their liking.

Add to the comfort of travel and increase traveling. Write for full details.

THE RADIANT ELECTRIC HEATER

SUPERIOR MANUFACTURING COMPANY
CARNEGIE, PA. *1



THE RITCHIE LIQUID COMPASS

The Standard Liquid Compass the world over.

Used Exclusively in U. S. Navy for over 40 years.

Over 65,000 on Merchant Vessels in all

parts of the world.

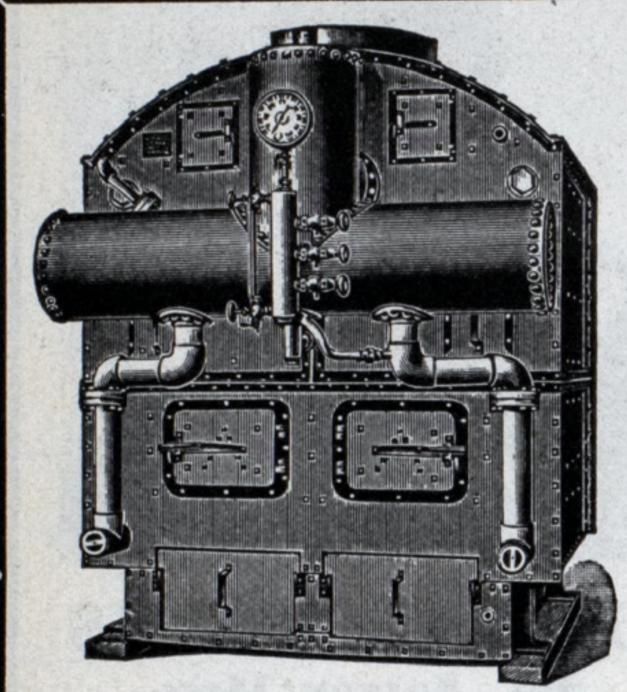
Made in all sizes 2 to 12" dia.

Magnets for adjusting Purposes.

E. S. RITCHIE & SONS

Brookline, Mass., U.S.A.

Agents for the Great Lakes,
The Upson-Walton Company, Cleveland, Ohio



Almy Water Tube Boiler Co.

Builders of
Sectional Water
Tube Boilers
for all types of
vessels

Providence, R. I. U. S. A.

CATALOGUE FREE

OLDMAN BOILER WORKS, Inc.

Boilers, Tanks, Stacks, Structural Work and Castings

Boiler Repairing Promptly Attended to Day or Night

MARINE WORK A SPECIALTY ELECTRIC WELDING

Works: 36-40 Illinois Street

BUFFALO, N. Y.



ANDREW J. MORSE & SON, Inc.

221 High Street BOSTON, MASS.

Established 1837

Diving Apparatus and Submarine Armor
Fire Protection Equipment
The Invincible Nozzle

Catalogues on request

Star Brass Mfg. Co.

53 Oliver Street -::- Boston, Mass.
MANUFACTURERS OF

Accurate "Non-corrosive" Pressure and Recording Gauges, Revolution Counters, Marine Clocks.

Dead Weight Gage Testers.

Marine, Safety and Relief Valves for all pressures.

Marine Whistles and Sirens.

Extra Heavy Renewable Globe, Angle and Check Valves.

Star Outside Spring Steam Engine Indicators.

HIGH GRADE THROUGHOUT SPECIFY AND ORDER THE BEST.

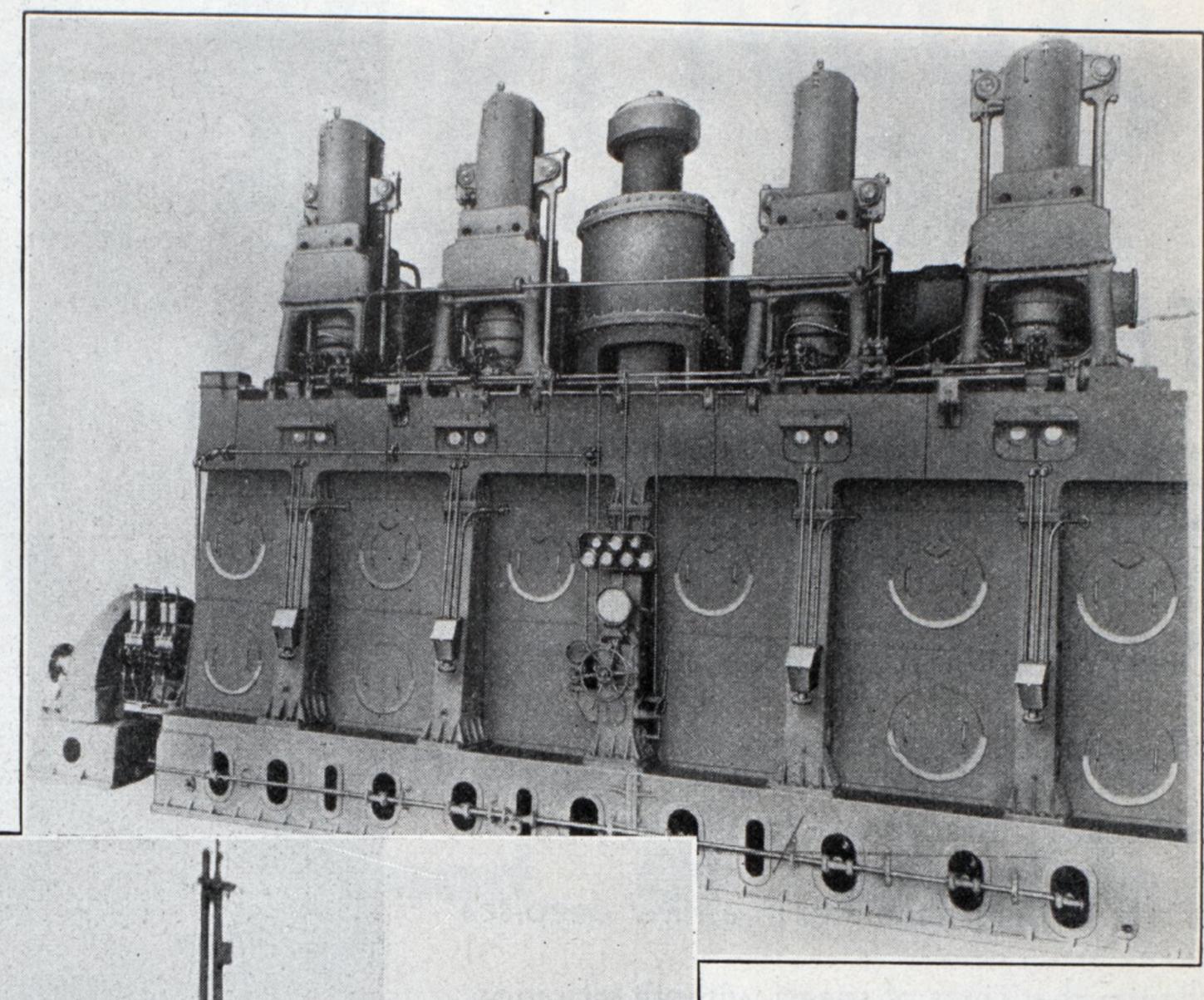
Branches: CHICAGO PITTSBURGH NEW YORK

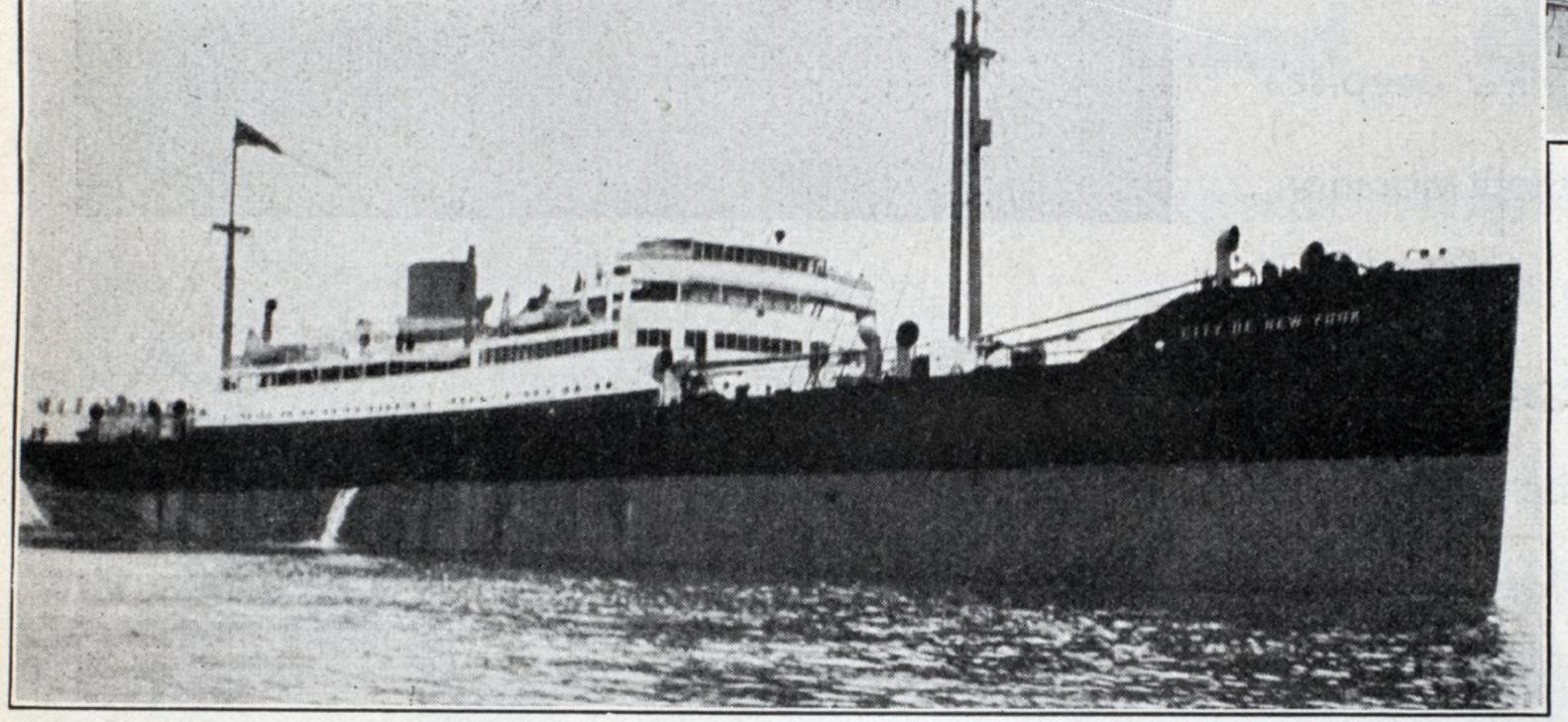
INDEX TO ADVERTISERS

Almy Water Tube Boiler Co. American Locomotive Co. American Ship Building Co.	10
Babcock & Wilcox Co Bethlehem Shipbuilding Corp. Boland & Cornelius	3
Carnegie Steel Company	ver
Davis Engineering Corporation	53 51
Electric Storage Battery Co	47
Fairbanks, Morse & Co.	-
General Electric Co	-
Hamburg-American LinesBack Cov	51 ver
Isherwood, Sir Joseph W., & Co., Ltd	-
Jerguson Gage & Valve Co	53
Kearfoot Engineering Co	
MacGregor & King, Ltd	
Newport News Shipbuilding & Dry Dock Co Inside Back Co.	ver
New York Shipbuilding Co	
Oldman Boiler Works, Inc.	56
Reading, E. H	53 56
Samson Cordage Works Sheriffs Manufacturing Co. Sperry Gyroscope Co., Inc. Star Brass Mfg. Co. Stratford, Geo., Oakum Co. Sun Shipbuilding & Dry Dock Co.	55 53
Superior Mfg. Co. Troy Engine & Machine Co.	55
Vacuum Oil Co.	4
Warren Steam Pump Co. Westinghouse Air Brake Co. Westinghouse Electric & Mfg. Co.	- 8 -
White, Kelvin & Wilfrid O., CoBack Con Back Con	

Power with Efficiency

SUN-DOXFORD
Opposed-Piston
DIESEL
ENGINES





Many American Vessels are now equipped with American Built Sun-Doxford Diesel Engines built in the Sun Plant.

Builders of

Passenger and Cargo Vessels—Oil Tankers

Unlimited facilities for



MARINE REPAIRS

Two floating Dry Docks
11,000 Tons Lifting Capacity Each



SUN SHIPBUILDING & DRY DOCK

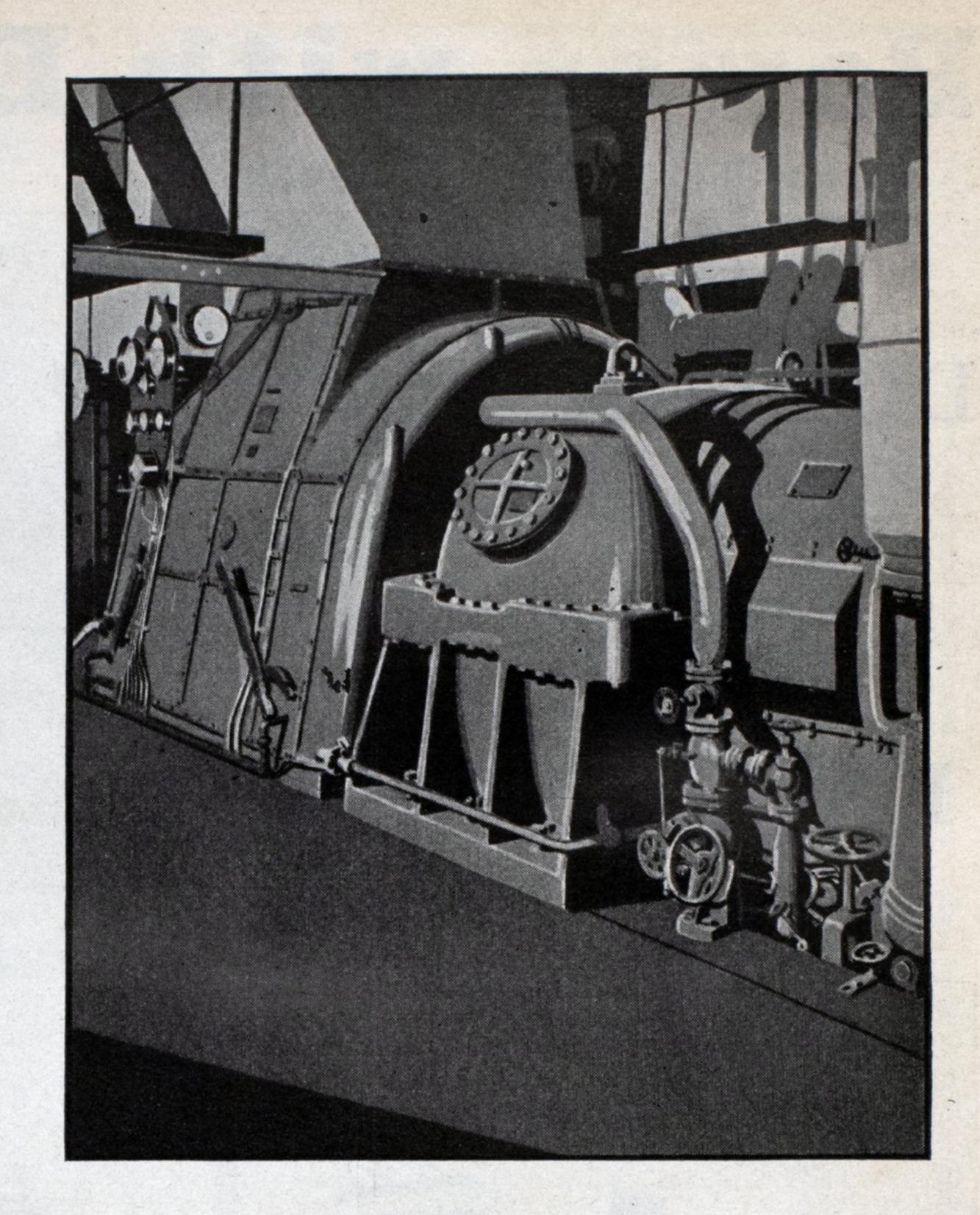
Shipyard & Main Office CHESTER, PA.

COMPANY

25 Broadway NEW YORK

THE ELECTRIC ENGINE ROOM

OPERATING instruments compactly grouped on a central switchboard—spotless floor and bulkheads—silence save for the subdued hum of the turbine-generator—a new deep-sea chantey that sings of speed without vibration, energy without effort, economy without stint.



That is the engine room of an all-electric ship. • It symbolizes the trend of ocean travel—the comfort that must, nowadays, be carried to sea—the enjoyment that makes the voyage an object in itself.

• It is also a recognition by forward-looking lines of the commercial advantages that attend modernization—the investment value of electric propulsion; its appeal to fastidious travelers; its speed and reliability; the completeness and dependable operation of ships' auxiliaries. • General Electric marine engineers speak with the certitude born of comprehensive experience in the equipment of all-electric ships. Whether your preference is for turbine-electric, turbine-gear, or Diesel-electric drive,



GENERAL
ELECTRIC
MARINE EQUIPMENT

they can prove to you the sound business policy of meeting modern demands with modern methods of propulsion.

173-18

NEWPORT NEWS For the Stine S. S. PRESIDENT COOLIDGE Sister ship of the S. S. PRESIDENT HOOVER Delivered Five Months Ahead Of Schedule Newport News Shipbuilding and Dry Dock Company Newport News, Va. 90 Broad St. New York City PRESIDENT HOOVER THE RESIDENCE OF THE PARTY OF T



THOROUGHLY WATER-RESISTING PERMANENTLY LUBRICATED EASY TO HANDLE AND SPLICE— WET OR DRY

DOES NOT SWELL, HARDEN or KINK

ALWAYS REMAINS FLEXIBLE NOT AFFECTED BY CLIMATIC **CHANGES**

LASTS LONGER—SERVES BETTER COSTS NO MORE

WHITLOCK CORDAGE COMPANY

46 South Street, New York

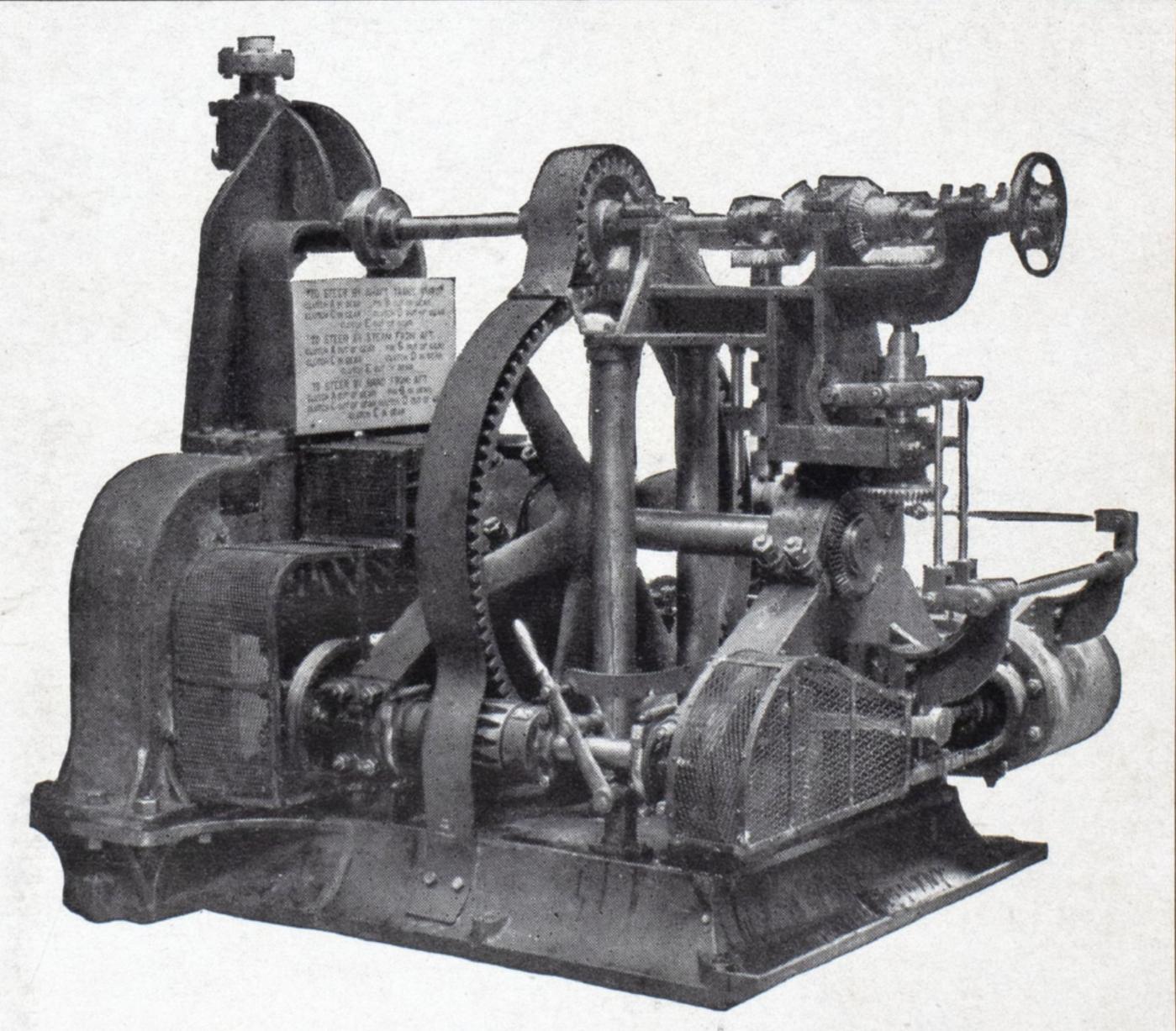
If You Want The Best Specify

- S. S. "A. F. HARVEY" owned by Pittsburgh Steamship Co. and built by Great Lakes Engineering Works.
- S. S. "B. F. AFFLECK" owned by Pittsburgh Steamship Co. and built by Toledo Shipbuilding Co.
- S. S. "S. T. Crapo" owned by Huron Transportation Co. and built by Great Lakes Engineering Works.

These three fine new boats are all equipped with

Steering Gear Steering Gear Windlass Mooring Winches Hatch Winches

Quadrant Type



HYDE Quadrant Type Steering Gear

Hyde Windlass Company Bath, Maine